

RECORD OF DECISION

Operable Unit One

Peninsula Boulevard Groundwater Plume Superfund Site

Village of Hewlett, Town of Hempstead, Nassau County, New York

United States Environmental Protection Agency
Region II
New York, New York

September 2011

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Peninsula Boulevard Groundwater Plume Superfund Site
Village of Hewlett, Town of Hempstead, Nassau County, New York

Superfund Site Identification Number: NYD000204407
Operable Unit: 01

STATEMENT OF BASIS AND PURPOSE

This Record of Decision (ROD) documents the U.S. Environmental Protection Agency's selection of a groundwater remedy for the Peninsula Boulevard Groundwater Plume Site, chosen in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA), 42 U.S.C. Section 9601, *et seq.*, and the National Oil and Hazardous Substances Pollution Contingency Plan, 40 CFR Part 300. This decision document explains the factual and legal basis for selecting a remedy to address the contaminated groundwater at the Site. The attached index (see Appendix III) identifies the items that comprise the Administrative Record, upon which the selected remedy is based.

The New York State Department of Environmental Conservation (NYSDEC) was consulted on the planned remedy in accordance with CERCLA Section 121(f), 42 U.S.C. Section 9621(f), and NYSDEC concurs with the selected remedy (see Appendix IV for the NYSDEC concurrence letter).

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from the Site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF THE SELECTED REMEDY

The response action described in this ROD represents the first planned remedial phase or operable unit at the Site. It addresses groundwater contamination. The source of the groundwater contamination will be addressed as the second remedial phase or operable unit and will be the subject of a subsequent decision document.

The major components of the selected remedy for groundwater include the following:

- Extraction of the groundwater via pumping and ex-situ treatment of the extracted groundwater prior to discharge to a publicly owned treatment works (POTW) or surface water, or reinjection to the aquifer (to be determined during design);
- In-situ chemical treatment of targeted high concentration contaminant areas, as appropriate;
- Monitored natural attenuation for those areas where active remediation is not performed;
- Institutional controls; and,
- Long-term monitoring to ensure the effectiveness of the remedy.

DECLARATION OF STATUTORY DETERMINATIONS

The selected remedy meets the requirements for remedial actions set forth in CERCLA Section 121, 42 U.S.C. Section 9621, because it meets the following requirements: 1) it is protective of human health and the environment; 2) it meets a level or standard of control of the hazardous substances, pollutants, and contaminants which at least attains the legally applicable or relevant and appropriate requirements under Federal and State laws; 3) it is cost-effective; and 4) it utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable. In keeping with the statutory preference for treatment that reduces toxicity, mobility, or volume of contaminated media as a principal element of the remedy, the contaminated groundwater will be treated by implementing the selected remedy.

The selected remedy will not result in contaminated groundwater remaining on-site above levels that allow for unlimited use and unrestricted exposure. However, because it may take more than five years to attain the cleanup levels, a policy review will be conducted within five years after the completion of construction to ensure that the remedy is, or will be, protective of human health and the environment.

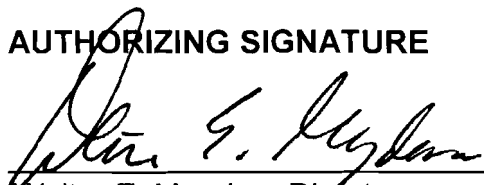
ROD DATA CERTIFICATION CHECKLIST

The ROD contains the remedy selection information noted below. More details may be found in the Administrative Record file for this Site.

- Contaminants of concern and their respective concentrations (see ROD, page 9 and Appendix II, Table 11);
- Baseline risk represented by the contaminants of concern (see ROD, pages 15–18);

- Cleanup levels established for contaminants of concern and the basis for these levels (see ROD, Appendix II, Table 12);
- Manner of addressing source materials constituting principal threats (see ROD, page 34);
- Current and reasonably-anticipated future land use assumptions and current and potential future beneficial uses of groundwater relied upon in the baseline risk assessment and ROD (see ROD, page 14);
- Potential land and groundwater use that will be available at the Site as a result of the selected remedy (see ROD, page 38);
- Estimated capital, annual operation and maintenance, and present-worth costs; discount rate; and the number of years over which the selected remedy cost estimates are projected (see ROD, page 26 and Appendix II, Table 14); and
- Key factors used in selecting the remedy (*i.e.*, how the selected remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria, highlighting criteria key to the decision) (see ROD, pages 34–36).

AUTHORIZING SIGNATURE



Walter E. Mugdan, Director
Emergency and Remedial Response Division
EPA – Region II

Sept. 30, 2011

Date

DECISION SUMMARY

Operable Unit One

Peninsula Boulevard Groundwater Plume Superfund Site

Village of Hewlett, Town of Hempstead, Nassau County, New York

United States Environmental Protection Agency
Region II
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SITE NAME, LOCATION, AND DESCRIPTION

The Peninsula Boulevard Groundwater Plume Superfund Site¹ (Site) consists of the area within and around a groundwater plume located in the Village of Hewlett, Town of Hempstead, Nassau County, New York. John F. Kennedy International Airport is located approximately three miles to the west of the Site. A Site location map is provided as Figure 1.

The area consists of a mix of commercial and residential properties, with the majority of the commercial properties being located along Mill Road, Peninsula Boulevard, Broadway, and West Broadway. Woodmere Middle School is located along the western Site boundary. Portions of Motts Creek, Doxey Brook Drain, and an unnamed tributary leading to Motts Creek are located within the Site area. The unnamed tributary and Doxey Brook Drain are classified by the New York State Department of Environmental Conservation (NYSDEC) as Class C streams. NYSDEC Classification C is for waters which support fisheries and are suitable for non-contact activities. The unnamed tributary and Doxey Brook Drain merge and eventually drain into Motts Creek (also a Class C stream) at the very northern portion of the Site boundary.

Topographically, the Site slopes north and west toward Doxey Brook Drain and Motts Creek with surface elevations decreasing from approximately 20 feet above mean sea level (msl) near the southern border of the Site to approximately one foot above msl in the vicinity of Doxey Brook Drain and the nearby Long Island American Water Company (LIAWC) property to the north.

LIAWC operates its Plant #5 Well Field on property located within approximately 1,000 feet of the northern boundary of the study area. LIAWC has been monitoring and treating groundwater pumped from this well field since 1991, and it continues to maintain monitoring and treatment activities to address both iron fouling, a common and naturally-occurring problem for Long Island water suppliers, and volatile organic compound (VOC) contamination.

SITE HISTORY AND ENFORCEMENT ACTIVITIES

A series of investigations and removal actions performed by NYSDEC from 1991 to 1999 at the former Grove Cleaners site revealed an extensive groundwater contaminant plume extending both to the north and south of Peninsula Boulevard, primarily consisting of the chlorinated volatile organic compound tetrachloroethylene (PCE).

¹ The Site's Superfund Site Identification Number is NYD000204407. The U.S. Environmental Protection Agency is the lead agency; the New York State Department of Environmental Conservation is the support agency.

The results of these investigations determined that operations at the former Grove Cleaners, located at 1274 Peninsula Boulevard from 1987 to 1992, resulted in the disposal of hazardous substances, including the VOCs PCE and trichloroethylene (TCE) to the environment. In March 1991, the Nassau County Department of Health (NCDH) cited Grove Cleaners for discharging hazardous waste into on-site dry wells. PCE was detected in soil and sludge samples collected at the Grove Cleaners site and in other media at and near the property. The results of the investigation suggested the potential for additional source areas other than the former Grove Cleaners site. Following the implementation of interim remedial measures, which consisted of the removal of impacted soils related to solvent discharge to a dry well, a No Further Action remedy was selected by NYSDEC in March 2003 for the former Grove Cleaners site.

On March 7, 2004, the U.S. Environmental Protection Agency (EPA) proposed inclusion of the Site on the National Priorities List (NPL); on July 22, 2004, EPA placed the Site on the NPL.

EPA conducted a Remedial Investigation (RI) at the Site from 2005 through 2010. Environmental sampling of groundwater, surface water, soil, and sediment was performed, and a Data Evaluation Report (DER) presenting the results of the environmental sampling was prepared in October 2008. Supplemental RI work was conducted in 2010 to address data gaps, including hydrogeological sampling and analyses, and to develop a baseline human health risk assessment (HHRA) and screening-level ecological risk assessment (SLERA). A DER Addendum was issued in December 2010 presenting the results of this sampling. An RI Report was released in June 2011.

The RI identified groundwater contaminated with PCE, PCE breakdown products, and low levels of other VOCs. The source of the PCE groundwater contamination has not yet been identified.

To date, no viable Potentially Responsible Parties (PRPs) have been identified.

HIGHLIGHTS OF COMMUNITY PARTICIPATION

The 2011 RI and Feasibility Study (FS) reports and the Proposed Plan for the contaminated groundwater at the Site were released to the public for comment on July 28, 2011. These documents were made available to the public at information repositories maintained at the Hewlett Library in Hewlett, New York and the EPA Region II Office in New York City. The notice of availability for the above-referenced documents was published in the *South Shore Herald* on July 28, 2011. The public comment period ran from July 28, 2011 to August 27, 2011. On August 3, 2011, EPA conducted a public meeting at the Hewlett High School to inform local officials and interested citizens about the Superfund process, to present the Proposed Plan for the Site, including the preferred groundwater remedial alternative, and to respond to questions and comments from the approximately 15 attendees. Responses to the questions and comments received at the public meeting and in writing during the public comment period are included in the Responsiveness Summary (see Appendix V).

SCOPE AND ROLE OF THE OPERABLE UNIT

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP), at 40 CFR Section 300.5, defines an operable unit as a discrete action that comprises an incremental step toward comprehensively addressing site problems. A discrete portion of a remedial response eliminates or mitigates a release, threat of a release, or pathway of exposure. The cleanup of a site can be divided into a number of operable units, depending on the complexity of the problems associated with the site.

The work at the Site has been divided into two operable units. Operable Unit 1 addresses the cleanup of the contaminated groundwater and is the subject of this ROD. Operable Unit 2 is to delineate of the source of the contaminated groundwater, which is ongoing.

The primary objectives of this action are to restore groundwater quality at the Site to drinking-water standards and to minimize any potential future health and environmental impacts from the groundwater.

SUMMARY OF SITE CHARACTERISTICS

EPA collected environmental data during the RI and other sampling efforts in order to determine Site characteristics, as well as gain information to perform a risk assessment. RI-related sampling of groundwater, surface and subsurface soil, surface water, sediment, and soil vapor on and around the Site was conducted in several phases from 2005 to 2011.

This ROD addresses the contaminated groundwater at the Site, the characteristics of which are summarized in this section and the “Summary of Site Risks” section, below. The results of the vapor-intrusion investigation, conducted simultaneously with the RI, are also detailed below.

Site Geology/Hydrogeology

The Site is situated within the Atlantic Coastal Plain Physiographic Province in the southwestern corner of Long Island, New York. The geologic conditions of the island are primarily the result of cycles of advancement and retreat of continental glaciers approximately 10,000 years ago. Sediments associated with the glacial periods include deposits of till, ice-contact stratified drift, outwash materials, and various other mixtures of sediments.

The stratified drift and till deposits are concentrated from the terminal moraines in the center of the island and are present northward to the north shore of the island. Unconsolidated Pleistocene-age strata consisting mostly of outwash deposits are present between the moraine sand and the south shore of the island, where they overlie Cretaceous-age, marine-derived sediments, and Pre-Cambrian bedrock. Cretaceous-age deposits range from the late Cretaceous Raritan Formation, composed of an upper clay member (Raritan clay) and a lower sand member (Lloyd aquifer), to the Magothy-Matawan group, which overlies the Raritan Formation. The Magothy is composed of deltaic quartzose sand of continental origin with some interbedded clay and silt. This formation represents one of the important water bearing units that comprise Long Island’s water supply aquifers.

Overlying the Magothy-Matawan group in portions of Long Island is the Jameco Gravel formation. The Jameco is the earliest of the Pleistocene deposits in the region, and has only been detected in Kings, southern Queens, and southwestern Nassau County. The thickness of this unit is highly variable owing to its origin as a channel fill deposit within a diversion pathway for the Hudson River. At one time, the course of the river was through what is now the southwestern end of Long Island.

Above the Jameco Gravel is a blue-grey clay layer, the Gardiners Clay, which forms a confining layer over the Jameco and Magothy-Matawan group in areas of the island. The Gardiners Clay was deposited in a marine environment during an interglacial period in the Pleistocene. This unit is the deepest encountered during previous phases of the investigation at the Site, with some of the deeper borings completed at the interface between the Gardiners Clay and the overlying unconsolidated Pleistocene deposits. The sediments above the Gardiners Clay are Pleistocene deposits forming the Upper Glacial Aquifer (UGA), the shallowest aquifer on the island.

The UGA consists primarily of meltwater-derived coalescing sheets of sand and gravel forming an outwash plain that extends southward from the terminal moraines to the Atlantic shore. In the vicinity of the Site, the UGA includes a thin layer of marine clay (as indicated by the presence of marine shells and plant remains), locally referred to as the “20-foot clay”, which was deposited during a phase of warmer climate within the Pleistocene glaciation. The “20-foot clay” thickens southward on the Site. Over approximately the southern half of the Site, available data indicated that it forms a clay layer thick enough to interrupt the hydraulic connection between the shallow and deep portions of the UGA, and therefore it is thought to result, effectively, in semi-confined conditions for the deeper UGA in this localized area.

The 2008 DER and the 2010 field investigation indicate that the “20-foot clay” is actually a clayey silt, and its competency increases southward across the Site. South of Peninsula Boulevard it appears to act as a confining unit and is encountered at depths ranging from 20 to 40 feet. The unit thins significantly to about a one-foot thickness in the northern portion of Site, based on analysis of geophysical logging of the re-drilled LIAWC wells at Plant #5, located just north of the Site. This unit may completely pinch out in the vicinity of the Plant # 5 Well Field. This combination of discontinuity and a significant silt fraction, rather than pure clay, indicates that it is not a complete confining layer but is likely a semi-confining unit, with that level of confinement being lost in the vicinity of the LIAWC Well Field.

The surficial and shallow subsurface geology in the Site includes a combination of pavement, gravel subgrade, and reworked native soils covering the ground surface. Where present, fill materials typically extend to a depth of approximately one foot below grade. Below the fill layer there are sporadic layers of peat, organic silts and fine sands, as noted at several subsurface locations near Peninsula Boulevard. Where present, these layers were encountered at a depth of approximately four to eight feet below ground surface (bgs) and exhibited a maximum thickness of approximately four feet. These layers of organic material may correlate with a former creek channel located in the vicinity of the Grove Cleaners site.

The geology and hydrostratigraphic units encountered during the 2010 supplemental RI field activities were very similar to what was reported from previous investigations conducted at the Site. The 2010 investigation focused on the Pleistocene units, with samples collected during intrusive activities to the top surface of the Gardiners Clay (at depth), upward through the lower portion of the UGA, into the 20-foot clay, and continuing upward to the surface through the shallow interval of the UGA.

On a regional basis, the groundwater regime in this area of Long Island is dominated by a groundwater divide located approximately 2000 feet south of Peninsula Boulevard, along a low ridge trending southwest to northeast. Groundwater in the UGA north of the divide exhibits flow with both northerly and westerly components. This depth-dependent variability in flow direction within the UGA is supported by water level data collected from wells completed in the shallow unconfined and deeper semi-confined intervals of the UGA. South of the divide, groundwater flow within the UGA appears to trend southward toward Macy Channel.

In this area of Long Island, the Jameco gravel, despite its limited extent, is a water-bearing zone of primary importance because of hydraulic conductivity values on the order of 200 feet per day (fpd). The LIAWC Plant #5 Well Field adjacent to the Site utilizes the Jameco as its source aquifer. North of the Site, the UGA directly overlies the Jameco. Given the similar hydraulic properties of the UGA and Jameco, there is the potential for significant hydraulic connection between the two units, with data from a broader area of Long Island indicating that to be the case. However, as noted above, new data obtained as a result of supplemental RI activities indicate that the Gardiners Clay acts as a confining unit in the localized area of the Site and the LIAWC Well Field.

At the Site, previously conducted drilling, sampling, and aquifer tests have focused on the unconfined and semi-confined portions of the UGA. In-situ hydraulic testing and aquifer pump tests indicate horizontal hydraulic conductivity values for the on-Site UGA material in the unconfined portion of the aquifer on the order of 5 fpd, with individual test results yielding values as high as 155 fpd. In the deeper portion of the UGA, horizontal hydraulic conductivity values of approximately 40 to 50 fpd were calculated, with individual test results up to 200 fpd. The interbedded nature of sediments in the UGA suggests significant vertical and horizontal variability in hydraulic conductivity values would be anticipated. Based on previous measurements conducted during drilling and testing at the Site, the depth to groundwater within the unconfined portion of the UGA ranges from approximately three to 15 feet bgs, while ranging from six to 17 feet bgs in the semi-confined portion of aquifer. Saturated thickness of the unconfined UGA above the "20-foot clay" layer ranges from 10 to 30 feet. Saturated thickness of the deeper portion of the UGA below the 20-foot clay, including the pressure head component imparted by the semi-confined conditions, is approximately 55 to 65 feet.

Groundwater elevation data collected from monitoring well clusters installed during the RI suggest that a significant downward vertical gradient exists between the unconfined and semi-confined portions of the UGA, especially toward the southern end of the Site along Broadway and West Broadway, where vertical gradients on the order of -0.1 feet/feet were calculated. Previous monitoring of water levels from on-Site wells does not indicate that tidal fluctuation of the water table occurs at the Site. No significant change was noted from manually collected water levels over a period encompassing at least one tidal cycle. Pressure transducer readings collected from other wells on-Site likewise exhibited no tidal signature over the period of record.

The groundwater hydraulics at the Site primarily focus on the characteristics of the UGA. In general, groundwater hydraulics are a function of the potentiometric (*i.e.*, hydraulic head) gradient and physical parameters or hydraulic conductivity of the aquifer. At the Site, the UGA is divided into two similar, yet distinctly different regimes. These upper and lower sub-units are divided by the discontinuous “20-foot clay”. For wells completed in the upper portion of the UGA, groundwater elevations are indicative of a typical unconfined, water table aquifer. In the deeper portions of the UGA, below the “20-foot clay”, groundwater-elevation measurements are similar to or lower than shallower wells at the same location, suggesting that, as a result of areal discontinuity, the “20-foot clay” does not constitute a fully confining unit between the sub-units of the UGA.

Groundwater Sampling

The RI groundwater sampling and chemical analyses were performed using two different methods, temporary well points and groundwater monitoring wells. The RI also included membrane interface probe (MIP) assessments and the hydraulic (slug) testing of wells. Table 1 in Appendix II presents a summary of the maximum concentrations of contaminants detected in groundwater. Exhibits summarizing the groundwater analytical data for the RI are presented as Tables 2 through 6.

A direct-push MIP investigation was conducted in 2006 and 2007 in the vicinity of the known extent of the groundwater plume (*i.e.*, the plume was noted to be located approximately along Hewlett Parkway, running in a north-south direction across Peninsula Boulevard), to evaluate subsurface conditions and target sampling intervals for discrete groundwater (Hydropunch[®]) sampling. The direct push investigation was conducted using MIP in conjunction with an electrical conductivity (EC) probe. The EC probe provided real-time stratigraphic data to supplement the data obtained from the MIP. The MIP system provided real-time, in-situ, qualitative borehole logging data utilizing an electronic capture detector, a flame ionization detector, and photoionization detector to evaluate the presence of various VOCs in the subsurface.

MIP technology was used at 65 locations to provide real-time field data. The MIP screening was conducted along transect lines, with each transect starting at the center of the plume and proceeding outward at 150-foot intervals until the suspected boundary of the plume was encountered. Obtaining the data in this manner allowed for a better understanding of the nature and extent of the contaminant plume, provided screening level results to enhance the selection of the groundwater monitoring points and sampling intervals, and provided the project team with current information to support critical on-site decisions on the field sampling.

The MIP/EC probe was advanced through unconsolidated material to an approximate depth of 75 feet bgs using a direct-push drill rig. The resulting data was used to evaluate the appropriate intervals for subsequent Hydropunch® groundwater sampling. Specifically, the MIP data was used to target groundwater sampling intervals in such a way as to “bracket” the plume both horizontally and vertically. At a minimum, the MIP data was used to target groundwater sampling intervals to quantify concentrations at the top of the plume, the mid-depth of the plume, and the bottom of the plume if evidence of the plume being present (*i.e.*, elevated VOC-related readings) was encountered. Hydropunch® groundwater samples were collected at the plume boundaries to confirm the horizontal extent of the plume. A minimum of three groundwater samples were collected from each sampling location where MIP results indicated the presence of contamination. If no evidence of a VOC contaminant plume was encountered, a groundwater sample was collected from a depth corresponding to the highest measurable VOC response detected in the nearest MIP boring. The locations of the Hydropunch® samples are shown on Figure 2.

One hundred seventy Hydropunch® groundwater samples were collected and analyzed for VOCs on-site by a field gas chromatograph (GC). Fifteen groundwater samples were sent off-site to be analyzed in an USEPA Contract Laboratory Program (CLP) Routine Analytical Service (RAS) laboratory. In addition, to evaluate the precision of the field GC methodology, 44 samples were split and sent to an EPA-approved laboratory for analysis for quality assurance purposes.

Twenty-six monitoring wells and ten piezometers were installed at the Site from 2007 through 2010 in order to evaluate groundwater quality, to determine groundwater and surface water interaction, and provide hydrogeologic flow data. Twelve of these twenty-six monitoring wells were installed as six monitoring well couplets consisting of a shallow (well screen located approximately 30 feet or less below grade) and deep (well screen located approximately 60-80 feet below grade or deeper) wells. The well couplets were placed at locations MW-10, MW-13, MW-15, MW-18, MW-21, and MW-22. The couplets were spaced approximately 500 feet apart along a transect running the long north-south axis of the PCE plume, parallel to groundwater flow.

Seven monitoring wells were screened from 15 to 25 feet bgs (MW-14, MW-16, MW-17, MW-19, MW-11, MW-12, MW-20). Monitoring well MW-23 was screened at 35 feet bgs. The final locations of non-couplet wells were determined in the field, dependent on the findings of the MIP screening and the Hydropunch® groundwater sampling. These wells were generally located along the plume boundaries to help define and monitor the horizontal and vertical extent of the plume.

Four wells were installed as Continuous Multi-channel Tube (MW-24 through MW-29) wells in order to evaluate the connection between the shallow and deep portions of the UGA.

The horizontal placement of the piezometers was based on data from previous studies, data obtained during the MIP/EC screening phase, and data obtained during the Hydropunch[®] sampling. Piezometers were placed to assist in the collection of groundwater level measurements. The depth of the piezometers ranged from 15 to 20 feet bgs. Some piezometers were located outside the plume boundaries to provide a detailed assessment of groundwater flow direction. The locations of the wells and piezometers are shown on Figure 3.

EPA conducted groundwater sampling at the Site in 2007, 2008, 2010, and 2011. Analytical results for these samples were compared to the EPA and New York State Department of Health (NYSDOH) promulgated health-based protective Maximum Contaminant Levels (MCLs), which are enforceable standards for various drinking water contaminants.

Groundwater contamination exceeding applicable drinking water standards has been shown to exist within the Site plume area, at highly elevated concentrations in some areas. Seven VOCs were detected at concentrations exceeding applicable criteria. Chlorinated VOCs (CVOCs), PCE in particular, were identified as the plume-related contaminants of concern for the shallow and deep portions of the UGA at the Site. Specifically, PCE was detected at levels up to 30,000 micrograms per liter (µg/l) and TCE at concentrations up to 10,000 µg/l. Table 1 presents the maximum concentration detected for all analytes sampled in the groundwater.

The results of the RI indicate that the shallow and deep portions of the UGA have been impacted by CVOc contamination. The shallow UGA groundwater (0 to 30 feet bgs) PCE plume is approximately 3,500 feet long, oriented in a north-south direction. South of Peninsula Boulevard (upgradient), the plume is approximately 1,000 feet wide, and north of Peninsula Boulevard (downgradient) the plume is approximately 400 feet wide. The deep UGA (40 to 75 feet bgs) groundwater plume is approximately 1,110 feet long and 400 feet wide, oriented in a northeast-southwest direction (see Figures 4 and 5).

In October 2010, EPA collected a total of five groundwater samples from new production wells (re-drills) in the LIAWC Plant #5 Well Field. The following VOCs were detected in the analysis of these samples: chloromethane, chloroform, methyl tert-butyl ether (MTBE), PCE, and toluene. None of the concentrations detected exceeded groundwater criteria or drinking water standards.

Information obtained from LIAWC and the results of EPA's sampling at the new production wells located on the LIAWC Plant #5 property in October 2010 indicate that the Plant #5 Well Field has contamination similar to that found in the Site plume and therefore may be impacted by the contamination from the Site.

Since 1991, LIAWC has been treating groundwater pumped from this well field with an air stripper prior to distribution. The treated groundwater is tested and monitored by LIAWC in accordance with New York State and Nassau County regulations. No MCL exceedances of CVOCs in water distributed to the general public have been identified.

The results of the RI indicate that the potential for natural attenuation of chlorinated compounds varies across the Site. PCE daughter products were not consistently detected in the same groundwater wells as PCE. Given site-specific conditions, natural attenuation of CVOCs does not appear to be a dominant process in the subsurface.

Surface Water Sampling Results

Five surface water samples were collected within the Site plume boundary. A sixth sample was collected at an off-Site location. The six surface water samples were analyzed for VOCs, SVOCs, and metals. The laboratory analytical results were compared to the NYSDEC regulations, Chapter X, Part 703: Surface Water and Groundwater Quality Standards and Groundwater Effluent Limitations, Part 703.5, Table 1, Class C.

PCE and TCE were detected in all six of the surface water samples. PCE was detected at concentrations between 3.3 – 49 ug/l, and TCE between 0.32 – 4.3 ug/l. The highest concentrations of PCE and TCE were found at the unnamed tributary to Mott's Creek. The sample with the lowest concentration of both PCE and TCE was located off-Site.

VOCs, SVOCs, and metals were not detected in concentrations above the Surface Water Quality Standard in any of the six samples analyzed.

Sediment Sampling Results

Five sediment samples were collected within the plume boundary and a sixth sample was collected off-Site. The six sediment samples were analyzed for VOCs, SVOCs, pesticides and metals. The VOC, SVOC, and pesticide results were compared to the NYSDEC Technical Guidance for Screening Contaminated Sediments, Table 1, Human Health Bioaccumulation, Sediment Criteria. Human health-based sediment criteria for the plume-related compounds (and other VOCs detected) were not available. The metals results were compared to the NYSDEC Technical Guidance for Screening Contaminated Sediments, Table 2, Lowest Effect Level and Severe Effect Level. No Site-related contaminants were detected above the criteria.

Six SVOCs were detected in one or more samples above the criteria. Dichlorodiphenyldichloroethane was detected above the criteria in four of the samples; dichlorodiphenyldichloroethylene in two samples and dichlorodiphenyltrichloroethane in one sample.

Metals detected above their constituent criteria include cadmium, copper, lead, mercury, and zinc. Cadmium concentrations ranged from 0.46 - 0.89 parts per million (ppm); copper, 5.5- 37 ppm; lead, 15-140 ppm; mercury, 0.034-0.49 ppm; and zinc from 18-180 ppm.

Samples collected from the unnamed tributary to Mott's Creek and the Doxey Brook Drain exhibited the highest number of metal exceedances. The off-Site sediment sample generally had similar or lower concentrations of analytes detected.

Interstitial Water Sampling Results

Interstitial water is the water present in sediments. Five interstitial water samples were collected within the Site plume boundary, and a sixth sample was collected off-Site. The six interstitial water samples were analyzed for VOCs. The laboratory analytical results were not compared to any criteria, as none are directly applicable.

VOCs were detected in all of the interstitial water samples, except the sample located in Motts Creek. Plume-related VOCs, PCE and TCE, were detected. PCE and TCE were detected in 3 samples PB-DBW01-01, PB-DBW02-01, PB-DBW03-01; PCE was also detected in an additional sample. PCE was detected at concentrations between 0.13 - 15 µg/l; TCE between 0.2 – 1.6 µg/l.

Vapor Intrusion

EPA is conducting an ongoing investigating of the soil vapor intrusion pathway at the Site. VOC vapors released from contaminated groundwater and/or soil have the potential to move through the soil and seep through cracks in basements, foundations, sewer lines, and other openings.

EPA conducted vapor intrusion sampling at fifteen residences at the Site. EPA drilled through the slabs in the basements and installed ports in order to sample the soil vapor under these residences. Samples of this air from beneath the slab, referred to as "sub-slab samples," were collected at a slow flow rate over a twenty-four hour period. Samples were also collected outside several residences to determine if there were any outdoor sources that may impact indoor air. These samples were then sent to a laboratory for analyses. The results of the analyses indicated that one residence had concentrations of VOCs at or above EPA Region 2 screening levels in sub-slab.

In July 2008, sub-slab, indoor air, and ambient air samples were collected from two residential locations not previously sampled in addition to one of the initial nine residential properties sampled in March 2008. This sampling indicated that one residence had concentrations of both PCE and TCE in the sub-slab and indoor air at or above EPA Region 2 screening levels.

EPA performed additional vapor intrusion sampling in February 2009, collecting sub-slab, indoor air, and ambient air samples from four residences, including the abovementioned residence with elevated levels of VOCs. VOCs were found at concentrations at or above EPA Region 2 screening levels in sub-slab and indoor air at the residence of concern. EPA installed a sub-slab depressurization system at this residence on July 28, 2009 to mitigate the impacts of soil vapor intrusion by reducing or eliminating vapor entry into the building. EPA sampled indoor air in this residence in February 2010, and PCE was not detected.

EPA sampled sub-slab, indoor air, and ambient air at four residences in March 2011, including the one residence which has an operational a sub-slab depressurization system. The results of these analyses indicate that two residences have concentrations of PCE in the sub-slab (including the residence with the sub-slab depressurization system) at or above EPA Region 2 screening levels. Future monitoring will be conducted.

In addition to sampling residences for soil vapor intrusion, EPA sampled the North Woodmere Middle School in 2004 using a mobile laboratory to analyze the results. PCE was not detected in the basement, the area through which vapors would enter the building if there were vapor intrusion impacts from the groundwater plume (there is no slab in the basement, only a dirt floor). No PCE was detected in the classrooms or the auditorium. Trace levels of PCE were detected in the art room and in the drains in a bathroom (possibly from art supplies and personal hygiene products such as hair gel). The trace levels detected (0.15 - 0.35 parts per billion or ppb) do not pose any health concern.

To date, sub-slab soil gas and/or indoor air samples have been collected and analyzed from fifteen residential locations. EPA will continue to investigate the soil vapor intrusion pathway at the Site.

Contamination Fate and Transport

The migration of plume-related VOCs has most probably occurred from unknown disposal activities at formerly and currently operating dry cleaners in the area of the Site. The discharge of commercially-used products, *i.e.*, PCE, used by dry cleaning operations through uncontrolled disposal methods such as Class 5 Underground Injection Control (UIC) dry wells, is a primary mechanism of release. The behavior of chlorinated solvents (*e.g.*, PCE and TCE) dissolved in ground water is governed by their physical and chemical properties and the nature of the subsurface through which the groundwater flows.

Contaminants may migrate through the environment via percolation of rainfall through soil to groundwater. If mobile chemicals are discharged to the environment into soils, natural processes act to move those chemicals through the subsurface soil and groundwater. This mechanism can be enhanced through discharge of contaminants through a “delivery system” to deeper levels of soil and groundwater, such as a dry well. The pumping of wells in the area of groundwater contamination can also enhance the flow rate or modify the direction of flow in an aquifer.

The plume-related VOC contamination, including elevated levels of PCE and, to a lesser extent, TCE and cis-1,2-dichloroethene (cis-1,2-DCE), are known to have adversely impacted the UGA aquifer and have potentially impacted the public water supply wells tapping the deeper Jameco aquifer within and in the vicinity of the Site.

The potential for Dense Non-Aqueous Phase Liquid (DNAPL) exists at the Site, based on the elevated concentrations of PCE detected at several sampling locations during the RI. PCE has a solubility of 200,000 ug/l, and it may be present in the subsurface as a DNAPL at locations where the concentration of PCE in groundwater is above 1 % of its solubility (i.e., greater than 2,000 ug/l). DNAPLs are chemicals or mixtures of chemicals that have two major characteristics: DNAPLs are heavier than water, and they are only slightly soluble in water. These two physical characteristics mean that when released into the environment in sufficient quantity, they can move through soils and groundwater until they encounter a sufficiently resistant layer that will impede further mass vertical movement, thus allowing the liquid to pool. Depending upon the nature of the release, the movement through the subsurface soils can be quite complex, as the liquid follows the path of least resistance, not necessarily following the groundwater flow. For example, soils considered homogenous often have subtle differences in layering that can cause a DNAPL to run and drop many times, creating a complex of thin horizontal and vertical ganglia, or stringy pools that flow vertically with gravity or horizontally along confining zones in the subsurface.

Both DNAPL soil residuals, which are the most common form of contamination or release encountered, and DNAPL pools become slowly dissolving sources of groundwater and soil vapor contamination. In addition, low conductivity areas into which the DNAPL mass and/or the dissolved-phase plume have diffused or migrated can in turn become sources of low-level contamination after the DNAPL mass has disappeared.

In theory, DNAPL PCE may have accumulated at the top of the confining unit and gradually diffused through this unit to the deep UGA. The DNAPL may also have traveled northward along the surface of the Gardiners Clay to appear where limited deep UGA data was collected.

Figure 6 depicts the current conceptual Site model which illustrates contaminant sources, release mechanisms, exposure pathways, migration routes, and potential human and ecological receptors.

CURRENT AND POTENTIAL FUTURE LAND AND RESOURCE USES

Land Use

The land use pattern at the Site is one of complete development, with large areas of impervious surfaces and little remaining natural area. The area consists of a mix of commercial and residential properties, with the majority of the commercial properties being located along principal thoroughfares of Mill Road, Peninsula Boulevard, Broadway, and West Broadway. Several hundred residences are located throughout the Site. Most residences are single-family homes. There are several small apartment buildings at the Site, as well as commercial buildings containing medical and professional offices. Approximately 24,688 people live within one mile of the center of the Site according to the 2000 Census.

LIAWC operates its Plant #5 Well Field on property located within approximately 1,000 feet of the northern boundary of the Site. All residences and commercial buildings within the Site are connected to the public-water supply.

EPA expects that the land-use pattern at the Site will not change. Figure 7 presents the Town of Hempstead Land Use Map.

Groundwater Use

Groundwater use on Long Island is dependent on the water supply available from the aquifers underlying the island. These aquifers, including the UGA, Jameco, Magothy, and Lloyd, comprise a system of sole or principal source aquifers that are defined by EPA as supplying at least 50% (and in actuality providing 100%) of drinking water consumed in the area overlying the aquifers. The aquifers underlying Long Island are composed primarily of sand and gravel, mixed with lesser amounts of silt and clay.

In the vicinity of the Site adjacent to the northern plume boundary, LIAWC maintains a water supply plant (Plant #5) and well field that, along with other area LIAWC plants, provides water to a significant population of southwestern Nassau County. LIAWC utilized wells from the shallowest aquifer, the UGA, through at least the mid-1990s. There is evidence that the confining layer of the "20-foot clay" pinches out in the vicinity of Plant #5 Well Field. Information provided by LIAWC during the RI indicates that, as of September 2010, LIAWC has taken all of its UGA wells out of commission and is pumping exclusively from the Jameco at the Plant #5 Well Field.

Other LIAWC plants in the area (including Plants #9, #10, #15, and #24), located north of Plant #5 Well Field and the Site, utilize the Magothy as their source aquifer. Water supplied to the residences and businesses at the Site is a blend of water provided through a complex, integrated system of well fields and water treatment and storage plants.

SUMMARY OF SITE RISKS

A baseline risk assessment is an analysis of the potential adverse human health effects caused by the release of hazardous substances from a site in the absence of any actions to control or mitigate these under current and anticipated future land uses.

EPA's baseline risk assessment for this Site, which was part of the 2011 RI/FS report, focused on contaminants in the groundwater which were likely to pose significant risks to human health and the environment. The risk assessment for this Site, entitled *Baseline Human Health Risk Assessment for the Peninsula Boulevard Groundwater Plume Site, Village of Hewlett, Town of Hempstead, Nassau County, New York*, prepared by CH2M Hill for HDR Inc., May 17, 2011, is available in the Administrative Record.

Human Health Risk Assessment

A Superfund baseline human health risk assessment is an analysis of the potential adverse health effects caused by hazardous substance exposure from a site in the absence of any actions to control or mitigate these under current- and future-land uses. A four-step process is utilized for assessing site-related human health risks for reasonable maximum exposure scenarios.

Hazard Identification: In this step, the contaminants of concern at the Site in various media (*i.e.*, soil, groundwater, surface water, sediment, and air) are identified based on such factors as toxicity, frequency of occurrence, and fate and transport of the contaminants in the environment, concentrations of the contaminants in specific media, mobility, persistence, and bioaccumulation.

Exposure Assessment: In this step, the different exposure pathways through which people might be exposed to the contaminants identified in the previous step are evaluated. Examples of exposure pathways include incidental ingestion of, inhalation of, and dermal contact with contaminated soil. Factors relating to the exposure assessment include, but are not limited to, the concentrations to which people may be exposed and the potential frequency and duration of exposure. Using these factors, a reasonable maximum exposure scenario, which portrays the highest level of human exposure that could reasonably be expected to occur, is calculated.

Toxicity Assessment: In this step, the types of adverse health effects associated with contaminant exposures and the relationship between magnitude of exposure and severity of adverse health effects are determined. Potential health effects are contaminant-specific and may include the risk of developing cancer over a lifetime or other non-cancer health effects, such as changes in the normal functions of organs within the body (*e.g.*, changes in the effectiveness of the immune system). Some contaminants are capable of causing both cancer and non-cancer health effects.

Risk Characterization: This step summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative assessment of site risks. Exposures are evaluated based on the potential risk of developing cancer and the potential for non-cancer health hazards. The likelihood of an individual developing cancer is expressed as a probability. For example, a 10^{-4} cancer risk means a “one-in-ten-thousand excess cancer risk”; or, stated another way, one additional cancer may be seen in a population of 10,000 people as a result of exposure to site contaminants under the conditions explained in the Exposure Assessment. Current Superfund guidelines for acceptable exposures are an individual lifetime site-related excess cancer risk in the range of 10^{-4} to 10^{-6} (corresponding to a one-in-ten-thousand to a one-in-a-million excess cancer risk) with 10^{-6} being the point of departure. For non-cancer health effects, a hazard index (HI) is calculated. An HI represents the sum of the individual exposure levels compared to their corresponding reference doses. The key concept for a non-cancer HI is that a “threshold level” (measured as an HI of less than 1) exists below which non-cancer health effects are not expected to occur.

As part of the RI, EPA conducted a baseline risk assessment to estimate the current and future effects of contaminants on human health and the environment. A baseline risk assessment is an analysis of the potential adverse human health and ecological effects of releases of hazardous substances from a site in the absence of any actions or controls to mitigate such releases, under current and future land, groundwater, surface water, and sediment uses. The baseline risk assessment includes a Human-Health Risk Assessment (HHRA) and an ecological risk assessment.

The cancer risk and non-cancer health hazard estimates in the HHRA are based on current reasonable maximum exposure scenarios and were developed by taking into account various health protective estimates about the frequency and duration of an individual's exposure to chemicals selected as chemicals of potential concern (COPCs), as well as the toxicity of these contaminants. Cancer risks and non-cancer HIs are summarized.

The Site is currently a residential neighborhood, with some nearby properties designated as mixed commercial. Future land use is expected to remain the same. The baseline risk assessment began by selecting COPCs in the various media that would be representative of Site risks. The media evaluated as part of the human health risk assessment included soil (0-10 feet), groundwater, and surface water and sediment from the Doxy Brook Drain, Motts Creek, and the unnamed tributary. Groundwater at the Site is designated by NYSDEC as a potable water supply. The chemicals of concern (COCs) for the Site are cis-1,2-DCE, PCE, TCE, and vinyl chloride (VC) for groundwater pathways.

The baseline risk assessment evaluated health effects that could result from exposure to contaminated media through use of groundwater for potable purposes (including inhalation of vapors in the bathroom during and after showering), direct exposure to groundwater in an excavation trench, wading in Site waterways, direct contact exposure to surface (0-2 feet) and subsurface soil (2-10 feet), and inhalation of vapors from surface soils. Based on the current zoning and anticipated future use, the risk assessment focused on a variety of possible receptors, including current and future recreational users, future residents, future commercial workers, and future construction workers. However, consistent with the anticipated future use of the Site, the receptors most likely to be in contact with media impacted by site-related contamination (e.g., groundwater) were primarily considered when weighing possible remedies for the Site.

These include the future residents, future commercial workers, and future construction workers. A complete discussion of the exposure pathways and estimates of risk can be found in the *Human Health Risk Assessment* for the Site in the information repository.

EPA's statistical analysis of groundwater-sampling data determined that the average exposure concentration of cis-1,2-DCE, PCE, TCE, and VC in the groundwater were 710 µg/l, 11,000 µg/l, 920 µg/l, and 59 µg/l, respectively. All of these exposure concentrations are in excess of EPA's Safe Drinking Water Act MCLs of 70 µg/l, 5 µg/l, 5 µg/l, and 2 µg/l, respectively; these concentrations also exceed the NYSDOH MCLs, which are 5 µg/l for cis-1,2-DCE, PCE, and TCE, and 2 µg/l for VC. These concentrations are associated with an excess lifetime cancer risk 2×10^{-1} for the future adult and child resident and 2×10^{-2} for the future commercial worker. A hazard quotient (HQ) is a ratio which can be used to estimate if risk to harmful effects is likely or not due to the contaminant in question. The calculated non-carcinogenic HQs for the Site are: future adult resident HQ=300, future child resident HQ=600, and future commercial worker HQ=50.

These cancer risks and non-cancer health hazards indicate that there is significant potential risk to potentially exposed populations from direct exposure to groundwater or and groundwater vapors. For these receptors, exposure to groundwater results in either an excess lifetime cancer risk that exceeds EPA's target risk range of 10^{-4} to 10^{-6} or an HI above the acceptable level of 1, or both.

A summary of the COCs and groundwater exposure point concentrations is listed in Appendix II, Table 7. The cancer and non-cancer risk-characterization summary for the groundwater COCs are presented in Appendix II, Tables 8 and 9. Cancer and non-cancer toxicity data for the groundwater COCs are presented in Appendix II, Tables 10 and 11.

Ecological Risk Assessment

The screening level ecological risk assessment (SLERA) focused on potential exposure to plume-related contaminants (*i.e.*, CVOCs). The CVOCs identified in the surface water, interstitial water, and/or sediments include *cis*-DCE; methylene chloride; PCE; TCE, and VC. While other contaminants were detected in environmental samples, these other compounds and their concentrations may be indicative of the urbanized nature of the area and are not considered site-specific contaminants.

The ecological receptors evaluated in the risk assessment included benthic macroinvertebrates in the aquatic environment and birds and small mammals in the terrestrial environment. Birds that were observed using the Site included the mallard duck, American robin, red-winged blackbird, common grackle, double-crested cormorant, blue jay, mourning dove, white-throated sparrow, green-winged teal, black-capped chickadee, tufted titmouse, northern flicker, song sparrow, Canada goose, northern cardinal, house sparrow, house finch, European starling, and killdeer. Mammals that were observed included the Norway rat, raccoon, and gray squirrel. Potential risks were not quantified for each observed species, however, the risk for each category of species was estimated using a receptor species (*e.g.*, raccoon) or species groups (*e.g.*, benthic macroinvertebrates) as surrogates to represent the various components of the ecological community.

The ecological receptors were assumed to be exposed to CVOCs in surface waters, interstitial waters, and sediments. However, it was assumed that the ecological receptors would not be exposed directly to groundwater resources. Additionally, it should be noted that VOCs were not detected in surface soil samples. Therefore, it is assumed that there was no contamination of these soils from the groundwater plume by the COCs.

The SLERA analyses included the comparison of the maximum concentrations of the contaminants of potential concern with the most appropriate, conservative ecological screening values that were identified for these compounds for each of the media of interest. The comparison of the maximum concentrations of each contaminant detected in the surface water, interstitial water, sediment, and surface soil with the ecological screening value(s) for each medium did not reveal any contaminants in excess of these screening values. Additionally, none of the contaminants of interest are known to bioconcentrate, biomagnify, or bioaccumulate.

Based on the results of the SLERA, concentrations of contaminants detected in surface water, interstitial water, sediment, and surface soil at the Site are unlikely to pose any unacceptable risks to aquatic or terrestrial ecological receptors at the Site.

Uncertainties in the Risk Assessment

The procedures and inputs used to assess risks in this evaluation, as in all such assessments, are subject to a wide variety of uncertainties. In general, the main sources of uncertainty include the following: environmental chemistry sampling and analysis; environmental parameter measurement; fate and transport modeling; exposure parameter estimation; and toxicological data. Uncertainty in environmental sampling arises in part from the potentially uneven distribution of chemicals in the media sampled. Consequently, there can be significant uncertainty as to the actual levels present. Environmental chemistry-analysis error can stem from several sources, including the errors inherent in the analytical methods and characteristics of the matrix being sampled.

Uncertainties in the exposure assessment are related to estimates of how often an individual would actually come in contact with the chemicals of concern, the period of time over which such exposure would occur, and the fate and transport models used to estimate the concentrations of the COCs at the point of exposure.

Uncertainties in toxicological data occur in extrapolating both from animals to humans and from high to low doses of exposure, as well as from the difficulties in assessing the toxicity of a mixture of chemicals. These uncertainties are addressed by making conservative assumptions concerning risk and exposure parameters throughout the assessment. As a result, the risk assessment provides upper-bound estimates of the risks to populations near the Site, and it is highly unlikely to underestimate actual risks related to the Site. An estimate of central tendency risk can be obtained by substituting average or median values for upper bound values. This is most useful for the exposure pathway which results in the highest estimated carcinogenic or non-carcinogenic risk, *i.e.*, groundwater ingestion.

More specific information concerning public health risks, including a quantitative evaluation of the degree of risk associated with various exposure pathways, is presented in the Risk Assessment Report. Additionally, specific uncertainties associated with the HHRA for the Site are discussed below.

Data Evaluation Uncertainty

The purpose of data evaluation is to determine which constituents, if any, are present at the Site at concentrations requiring evaluation in the HHRA. Uncertainty with respect to data evaluation can arise from many sources, such as the quality of data used to characterize a site and the process used to select data and COPCs included in the HHRA.

The screening levels of surrogate chemicals were used for various chemicals missing screening levels in the COPC selection process. These chemicals include polycyclic aromatic hydrocarbons (PAHs) and chlorinated pesticides. Surrogate chemicals were selected based on their similarities in chemical structure and/or expected mode of action and toxicology, and most of the surrogate chemicals selected for pesticide metabolites are their parent compound (for example, endrin selected as a surrogate chemical for endrin aldehyde). Although some uncertainty associated with the use of surrogate chemicals exists, the overall impacts on the results of COPC selection are expected to be insignificant because many of these chemicals are detected at low concentrations (that is, one to a few orders of magnitude lower than their surrogate screening levels).

Exposure Assessment Uncertainty

The 95 percent upper confidence level (UCL) concentrations were selected as exposure point concentrations (EPCs) for the chemicals for which more than eight samples and four detected concentrations are present within a data group. In general, the smaller the sample size and number of detected concentrations of a chemical, the less reliable the calculated 95 percent UCL becomes. Although the potential impacts on the overall HHRA conclusions (such as by the presence of COCs) are minimal because of the elevated concentrations in groundwater, and therefore the 95 percent UCL concentrations based on the small number of detected concentrations observed at the Site may not be reliable.

Using the EPCs based on 95 percent UCLs or maximum detected concentrations is likely to lead to an overestimation of actual exposure because receptors are assumed to be exposed to the 95 percent UCL or maximum detected concentration for the entire exposure duration. As the data indicate, many COPCs were not detected in all samples. Thus, the assumption that all potential exposures are to the 95 percent UCL or maximum detected concentration will likely result in an overestimation of actual exposures and estimates of potential risk.

In accordance with EPA guidance, exposure estimates were calculated for a reasonable maximum exposure (RME) scenario. An RME scenario results in upper-bound exposure estimates and overestimates average site exposures. For example, recreational receptors are assumed to ingest 40 milliliters (that is, approximately 1.5 ounces) of surface water each time they contact surface water. Exposure to surface water is unlikely to occur to such a great extent; therefore, the exposure assumptions used in this HHRA are expected to be conservative. Any anticipated risks are likely to be less than the RME estimates presented in this HHRA.

Toxicity Assessment Uncertainty

Non-cancer toxicity values were not available for two COPCs. A reference dose (RfD) was not available for methyl ter-butyl ether for the ingestion exposure route (that is, oral RfD) and for cis-1,2-DCE for the inhalation route (that is, inhalation RfC). This leads to an underestimation of non-cancer hazards, although the extent cannot be determined.

Toxicity values for TCE are not currently available in Tier 1 or Tier 2 sources discussed in Section 4 of the HHRA. Therefore, toxicity values obtained from Tier 3 toxicity sources (Cal/EPA, NCEA, and NYSDOH) were used in the HHRA. For assessing non-carcinogenic effects of TCE, USEPA Office of Solid Waste and Emergency Response has identified the following two non-carcinogenic RfC values that can be considered in evaluating systemic toxicity at sites addressed under CERCLA.

- Air criterion developed by NYSDOH (10 micrograms per cubic meter [$\mu\text{g}/\text{m}^3$])
- Chronic reference exposure level (REL) developed by Cal/EPA (600 $\mu\text{g}/\text{m}^3$)

The estimated non-cancer HQ/HI (presented in Section 5.4 of the HHRA) is based on the more conservative value (from NYSDOH) of the two Tier 3 RfCs. As discussed in USEPA's Toxicity Hierarchy guidance, draft toxicity assessments generally are not appropriate for use until they have been through peer review, the peer review comments have been addressed in a revised draft, and the revised draft is publicly available. Because of the uncertainty associated with the draft toxicity values, another set of non-cancer estimates were calculated based on the Cal/EPA chronic REL of 600 $\mu\text{g}/\text{m}^3$.

Summary of Human Health Risks

The results of the HHRA indicate that the contaminated groundwater presents an unacceptable exposure risk. The SLERA indicated that the Site does not pose any unacceptable risks to aquatic or terrestrial ecological receptors.

Based upon the results of the RI and the risk assessment, EPA has determined that actual or threatened releases of hazardous substances from the Site, if not addressed by the response action selected in this ROD, may present a current or potential threat to human health and the environment.

Basis for Action

Based upon the quantitative human-health risk assessment and ecological evaluation, EPA has determined that actual or threatened releases of hazardous substances from the Site, if not addressed by the response action selected in this ROD, may present a current or potential threat to human health and the environment.

REMEDIAL ACTION OBJECTIVES

Remedial Action Objectives (RAOs) are specific goals to protect human health and the environment. These objectives are based on available information and standards, such as applicable or relevant and appropriate requirements (ARARs), to-be-considered guidance, and Site-specific risk-based levels.

The following RAOs for contaminated groundwater (OU1) will address the human health risks and environmental concerns:

- Restore the impacted aquifer to beneficial use as a source of drinking water by reducing contaminant levels to the federal and State MCLs; and,
- Reduce or eliminate the potential for migration of contaminants towards the LIAWC.

The following RAO for soil vapor will address the human health risks and environmental concerns:

- Address existing or potential future exposure through inhalation of vapors migrating from contaminated groundwater into buildings at the Site.

The cleanup levels for the groundwater COCs and their basis are presented in Appendix II, Table 12.

SUMMARY OF REMEDIAL ALTERNATIVES

CERCLA Section 121(b)(1), 42 U.S.C. §9621(b)(1), mandates that remedial actions must be protective of human health and the environment, be cost-effective, comply with ARARs, and utilize permanent solutions, alternative treatment technologies, and resource recovery alternatives to the maximum extent practicable. Section 121(b)(1) also establishes a preference for remedial actions which employ, as a principal element, treatment to permanently and significantly reduce the volume, toxicity, or mobility of the hazardous substances, pollutants, and contaminants at a site. CERCLA §121(d), 42 U.S.C. §9621(d), further specifies that a remedial action must attain a level or standard of control of the hazardous substances, pollutants, and contaminants that at least attains federal and state ARARs, unless a waiver can be justified pursuant to CERCLA §121(d)(4), 42 U.S.C. §9621(d)(4).

The FS report presents detailed descriptions of four remedial alternatives for addressing the groundwater contamination. The four alternatives are: 1) No Action, 2) Enhanced Bioremediation, 3) In-Well Air Stripping, and, 4) Groundwater Pump and Treat.

The construction time for each alternative reflects only the time required to construct or implement the remedy and does not include the time required to design the remedy, negotiate the performance of the remedy with any potentially responsible parties (PRPs), or procure contracts for design and construction.

The remedial alternatives considered for the Site are:

Alternative 1: No Action

Capital Cost:	\$0
Annual Operation/Maintenance (O&M) Cost:	\$0
Present-Worth Cost:	\$0
Construction Time:	0 months

The Superfund program requires that the "no-action" alternative be considered as a baseline for comparison with the other alternatives. The no action alternative does not include any physical remedial measures (beyond those remedial and removal actions already completed) that address any site-related media.

Because this alternative would result in contaminants remaining on-site which exceed acceptable health-based levels, CERCLA would require that the Site be reviewed every five years. If justified by the review, additional response actions may be implemented.

Alternative 2: Enhanced Bioremediation

Capital Cost:	\$4,344,000
Annual O&M Cost:	\$835,000
Present-Worth Cost:	\$15,830,000
Construction Time:	9 – 12 months

This remedial alternative consists of implementing enhanced bioremediation in the plume area. Enhanced bioremediation is the process of destruction of contaminants by microorganisms in contaminated soil and water. Microorganisms consume organic substances for nutrients and energy. Enhanced bioremediation involves creating the proper conditions by injecting microorganisms or nutrients to the subsurface to accelerate the biodegradation of the CVOC contamination. The end products include carbon dioxide, water, and microbial cell mass. Monitoring of biogeochemical parameters is used to monitor the effectiveness of remediation.

Enhanced bioremediation can be implemented in different system configurations. For the purposes of developing a conceptual design and cost estimate for comparison with other technologies in the FS, a transect configuration was evaluated. This conceptual design would require the installation of approximately 146 permanent injection wells to remediate contamination in the shallow UGA plume and 78 permanent injection wells to remediate contamination in the deeper UGA. This conceptual design would require further evaluation during the remedial design if chosen to be implemented. Additional wells would have to be installed to monitor the progress of the remediation. This alternative is expected to remove the contaminant mass within eight to 16 years in the shallow UGA plume remediation area and within 25 to 50 years in the deep UGA plume remediation area.

Figure 8 illustrates the conceptual layout of extraction wells under Alternative 2.

Monitored natural attenuation (MNA)/long-term monitoring would be implemented to address areas of the plumes outside of the active remediation areas. MNA is a variety of in-situ processes which, under favorable conditions, act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in groundwater. Institutional controls would be established for groundwater use restrictions.

It is estimated that system construction would be completed in one year.

Because this alternative would take longer than five years for contaminants to achieve acceptable health-based levels, CERCLA would require that the Site be reviewed every five years. If justified by the review, additional response actions may be implemented.

Alternative 3: In-Well Air Stripping

Capital Cost:	\$7,730,000
Annual O&M Costs:	\$730,000
Present-Worth Cost:	\$16,710,000
Construction Time:	9 – 12 months

This remedial alternative includes the installation of in-well air stripping systems over the plume area. In-well air stripping is a physical treatment technology whereby air is injected into a vertical well that is installed and screened at two depths in the groundwater. Pressurized air is injected into the well below the water table, aerating the water. The aerated water rises in the well and flows out of the system at the upper screen, inducing localized movement of groundwater into (and up) the well as contaminated groundwater is drawn into the system at the lower screen. VOCs vaporize within the well at the top of the water table, where the air bubbles out of water. The contaminated vapors accumulating in the wells are collected via vapor extraction contained within the well. Typically, extracted vapors are treated (if necessary) above grade and discharged to the atmosphere. Vapor treatment, if required, generally consists of vapor-phase granular activated carbon (GAC).

The partially treated groundwater is never brought to the surface; it is forced into the unsaturated zone, and the process is repeated as water follows a hydraulic circulation pattern that allows continuous cycling of groundwater. As groundwater circulates through the treatment system in-situ and vapor is extracted, contaminant concentrations are reduced.

In-well air stripping can be implemented in different system configurations. For the purposes of developing a conceptual design and cost estimate for comparison with other technologies in the FS, a grid configuration was evaluated. This conceptual design would require the installation of approximately 80 permanent air stripping wells to remediate contamination in the shallow UGA plume and 30 permanent air stripping wells to remediate contamination in the deeper UGA. This conceptual design would require further evaluation during the remedial design if chosen to be implemented. Additional wells would have to be installed to monitor the progress of the remediation. This alternative is expected to remove the contaminant mass within five to 10 years in the shallow UGA plume remediation area and within 10 to 20 years in the deep UGA plume remediation area.

Figure 9 illustrates a typical In-Well Air Stripping system.

MNA/long-term monitoring would be implemented to address areas of the plumes outside of the active remediation areas. MNA is a variety of in-situ processes which, under favorable conditions, act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in groundwater. Institutional controls would be established for groundwater use restrictions.

It is estimated that construction related to this effort would be completed in one year.

The system would operate until one or more performance measures (e.g., diminished contaminant-removal efficiencies, etc.) are attained, at which point amendments such as ozone would be injected into the subsurface in order to aggressively destroy some of the remaining source materials. It is estimated that this system would need to be run for approximately seven years.

The effectiveness of this alternative would be determined based upon the attainment of specific performance standards and cleanup goals for each step in the treatment process (e.g., attainment of MNA performance monitoring standards, reduction in mass flux, etc.).

Under this alternative, pilot-scale testing would be used to determine, among other things, the configuration and number of in-well air stripper wells, the characterization of the extracted vapors, the application rates of the various reagents, and any other operation-and-performance parameters. These data would be used in the system-design evaluation. In addition, the extracted vapors might need to be treated before being vented to the atmosphere. Any treatment residuals would have to be appropriately handled (e.g., off-site treatment/disposal).

Because this alternative would result in contaminants remaining on-site which exceed acceptable health-based levels, CERCLA would require that the Site be reviewed every five years. If justified by the review, additional response actions may be implemented.

Alternative 4: Groundwater Pump and Treat

Capital Cost:	\$2,997,000
Annual O&M Costs:	\$1,185,000
Present-Worth Cost:	\$21,560,000
Construction Time:	6 – 9 months

This remedial alternative consists of the extraction of groundwater via pumping wells and treatment prior to disposal. Groundwater is pumped to remove contaminant mass from areas of the aquifer with elevated PCE concentrations. Pumping from downgradient wells would provide hydraulic control of the contaminated groundwater with lower PCE concentrations. For this conceptual design, it is estimated that nine groundwater extraction wells would be installed in the shallow and deep UGA. A treatment plant with the capacity of approximately 350 gallons per minute (gpm) would be constructed within or nearby the Site to achieve the mass removal and hydraulic control objectives. Extracted groundwater with VOC contamination is typically treated with either liquid phase GAC or air stripping, or both. Air stripper effluent air stream may be treated with vapor phase GAC, if necessary. During the remedial design, a determination will be made whether to discharge treated extracted groundwater to a publically owned treatment works (POTW) or surface water, or reinject it to groundwater.

In-situ chemical treatment would be utilized to enhance the groundwater pump and treat remedy, as appropriate. During the remedial design, a treatability study would be performed to evaluate the use of in-situ chemical treatment, either in-situ chemical oxidation (ISCO) or in-situ chemical reduction (ISCR). The results of the study would be used to design the in-situ chemical treatment component of this alternative in a manner that complements and improves the effectiveness of the groundwater extraction and treatment component.

ISCO is a process that involves the injection of reactive chemical oxidants (such as Peroxide, Fenton's Reagent, Permanganate) into the subsurface for rapid contaminant destruction. Oxidation of organic compounds using ISCO is rapid and exothermic and results in the reduction of contaminants to primarily carbon dioxide and oxygen. ISCR uses chemical reductants such as zero-valent iron (ZVI). The ZVI donates electrons, acting as the reductant in a reaction that removes chlorine atoms from chlorinated hydrocarbon contaminants such as PCE.

In-situ chemical treatments, such as ISCO and ISCR, were evaluated in the initial stages of the FS but were screened out of the final alternatives as stand-alone remedies because of the difficulty in implementation in a residential neighborhood, specifically obtaining access to residential properties. However, the use of in-situ chemical treatments targeting areas containing high concentrations of PCE that may reside outside the radius of influence of the pump within the inferred plume, as appropriate, in combination with groundwater extraction could potentially reduce the remediation time frames and the costs of this alternative.

Figures 10 and 11 illustrate a pump and treat system in the shallow and deep UGA.

Monitored natural attenuation (MNA)/long-term monitoring would be implemented to address areas of the plumes outside of the active remediation areas. MNA is a variety of in-situ processes which, under favorable conditions, act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in groundwater. Institutional controls would be established for groundwater use restrictions.

It is estimated that system construction would be completed in nine months.

Because this alternative would result in contaminants remaining on-site which exceed acceptable health-based levels, CERCLA would require that the Site be reviewed every five years. If justified by the review, additional response actions may be implemented.

COMPARATIVE ANALYSIS OF ALTERNATIVES

During the detailed evaluation of remedial alternatives, each alternative is assessed against nine evaluation criteria set forth in the NCP, namely, overall protection of human health and the environment, compliance with ARARs, long-term effectiveness and permanence, reduction of toxicity, mobility, or volume through treatment, short-term effectiveness, implementability, cost, and state and community acceptance.

The evaluation criteria are described below.

- Overall protection of human health and the environment addresses whether a remedy provides adequate protection and describes how risks posed through each exposure pathway (based on a reasonable maximum exposure scenario) are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.
- Compliance with ARARs addresses whether a remedy would meet all of the applicable or relevant and appropriate requirements of federal and state environmental statutes and requirements or provide grounds for invoking a waiver.
- Long-term effectiveness and permanence refers to the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup goals have been met. It also addresses the magnitude and effectiveness of the measures that may be required to manage the risk posed by treatment residuals and/or untreated wastes.
- Reduction of toxicity, mobility, or volume through treatment is the anticipated performance of the treatment technologies, with respect to the proposed remedial alternative, which a remedy may employ.
- Short-term effectiveness addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period until cleanup goals are achieved.
- Implementability is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.
- Cost includes estimated capital and operation and maintenance (O&M) costs, and net present-worth costs.
- State acceptance indicates if, based on its review of the 2011 FS and Proposed Plan, the state concurs with the preferred remedy at the present time.

- Community acceptance refers to the public's general response to the alternatives described in the 2011 FS report and Proposed Plan.

A comparative analysis of these alternatives based upon the evaluation criteria noted above follows.

Overall Protection of Human Health and the Environment

All of the alternatives except Alternative 1 (No Action) would provide protection of human health and the environment. Alternative 1 is not considered protective of human health and the environment because it does not restore groundwater quality or limit potential exposure to contaminated groundwater. Alternatives 2, 3, and 4 are active remedies that address groundwater contamination and would restore groundwater quality over the long term. Alternatives 2, 3, and 4 would also rely on certain natural processes to achieve the cleanup levels for areas outside of the treatment zones.

Protectiveness under Alternatives 2 and 3 requires a combination of reducing contaminant concentrations in groundwater and limiting exposure to residual contaminants through maintenance of existing institutional controls, and implementation of additional institutional controls, as well as MNA.

Protectiveness under Alternative 4 is achieved through reducing contaminant concentrations via extraction and treatment of groundwater. Alternative 4 also protects against the further migration of contaminated groundwater, as the extraction would also serve to function as a hydraulic plume containment mechanism.

The long-term monitoring program for groundwater and vapor would monitor the migration and fate of the contaminants and ensure that human health is protected. Combined with MNA, long-term monitoring, and institutional controls, Alternatives 2, 3, and 4 would meet the RAOs. Alternative 1 would not meet the RAOs.

Compliance with ARARs

EPA and NYSDOH have promulgated health-based, protective MCLs (40 CFR Part 141, and 10 NYCRR, Chapter 1), which are enforceable standards for various drinking water contaminants (chemical-specific ARARs). The aquifer is classified by NYSDEC as Class GA (6 NYCRR 701.18), meaning that it is designated as a potable water supply.

Although the groundwater at the Site is not presently being utilized as a potable water source, achieving MCLs in the groundwater is an applicable or relevant and appropriate requirements because area groundwater is a source of drinking water. Alternative 1 (No Action) would not involve any action to remediate contaminated groundwater and would thus not comply with chemical specific ARARs for groundwater. Alternatives 2 and 3 may potentially reach ARARs in the active remediation area of the plume sooner than Alternative 4. However, chemical-specific ARARs will be attained through treatment and certain natural processes (dilution and dispersion) for groundwater in all three of these alternatives.

Alternatives 2, 3, and 4 would comply with location- and action- specific ARARs.

Long-Term Effectiveness and Permanence

Alternative 1 (No Action) would not reduce risk in the long-term, since the contaminants would not be controlled, treated, or removed. Enhanced bioremediation under Alternative 2 is considered a reliable method for reducing contaminant concentrations in groundwater. In-well stripping under Alternative 3 and pump and treat under Alternative 4 are also considered effective technologies for treatment and/or containment of contaminated groundwater.

All three active alternatives (excluding alternative 1) rely on a combination of treatment in the active remediation area, natural processes, including dilution and dispersion for areas where active remediation is not implemented, and institutional controls.

Enhanced bioremediation under Alternative 2 has been demonstrated to be effective and reliable at numerous sites where groundwater has been treated to address CVOCs in contaminated areas. However, groundwater concentrations may rebound if there is continued migration of CVOCs from unknown source areas. If this were to occur, the time frame to achieve cleanup levels may be longer than estimated.

In-well air stripping under Alternative 3 is expected to be effective and reliable to significantly remove CVOCs. However, the effectiveness of this alternative is limited by radius of influence (ROI) or “reach” into the aquifer. The ROI would depend on the pumping capacity of each well and the hydrogeologic characteristics of the Site. In addition, the effectiveness of in-well air stripping may be limited in shallow aquifers because of the lack of vertical space in the well for “stripping.” A field pilot study would be necessary to determine pre-design parameters such as actual ROI, optimal well spacing, flow rates, and pumping capacity prior to full-scale implementation.

All three active alternatives rely upon institutional controls and MNA to some degree to ensure protection over the long term.

Reduction of Toxicity, Mobility, or Volume through Treatment

Under Alternative 1 (No Action), there would be no reduction in toxicity, mobility, or volume as there would not be any active treatment of contaminants in groundwater. Alternatives 2, 3, and 4 reduce the toxicity and volume of contaminants at the Site through treatment of contaminated groundwater. Alternative 2 uses biological processes to degrade contaminants in groundwater to less harmful compounds. Alternative 3 uses physical processes to remove the contaminants from the aquifer, and, provides chemical treatment for the collected vapor-phase contamination. Alternative 4 removes contaminated groundwater and treats it via a carbon treatment process.

Alternative 2 does not reduce the mobility of the contaminants in groundwater, and Alternative 3 may change the movement of contaminants in groundwater because the in-well air stripping treatment is expected to create groundwater mounding. Alternative 4 would be the most effective at reducing the mobility of the groundwater contamination by providing hydraulic control of the plume.

Each of the three active alternatives includes an MNA component for the lesser contaminated portion of the plume outside the active remediation area. MNA would provide limited further reduction in the toxicity and volume of contaminants in groundwater by transforming them into less harmful substances through natural biological, chemical, and other processes.

During the enhanced bioremediation and MNA biological degradation processes, PCE, TCE, and cis-1,2-DCE could be transformed into the more toxic vinyl chloride under anaerobic conditions in the subsurface, prior to aerobic degradation to the less toxic ethane. This transformation would need to be monitored and managed to prevent exposure via drinking contaminated water or inhalation through the vapor intrusion pathway.

After treatment, Alternatives 3 and 4 would generate residuals in a form of used GAC that would require regeneration, destruction, or disposal.

Short-Term Effectiveness

Alternative 1 (No Action) includes no construction or monitoring and would have no short-term impacts at the Site. Alternatives 2, 3, and 4 may have short-term impacts to remediation workers, the public, and the environment during implementation. Each of these three alternatives has short-term impacts because it would be necessary to construct parts of the remedy on the property of land owners and over roadways and right-of-ways. Remedy-related construction (e.g., trench excavation) under Alternatives 3 and 4 would require disruptions in traffic and street closure permits. In addition, Alternatives 3 and 4 have above-ground treatment components and infrastructure that may create a minor noise nuisance and inconvenience for local residents during construction.

Exposure of workers, the surrounding community and the local environment to contaminants during implementation of the three active alternatives would be minimal. No difficulties are foreseen with managing the required quantity of the bioremediation injection material needed in Alternative 2, as it is non-hazardous. Excavation activities in Alternatives 3 and 4 could produce contaminated vapors that present some risk to remediation workers at the Site. Drilling activities, including the installation of monitoring, in-well air stripping, injection, and extraction wells for Alternatives 2, 3, and 4, could produce contaminated liquids that present some risk to remediation workers at the Site. The potential for remediation workers to have direct contact with contaminants in groundwater could also occur when groundwater remediation systems are operating under Alternative 4. Alternative 4 could increase the risks of exposure, ingestion, and inhalation of contaminants by workers and the community because contaminated groundwater would be extracted to the surface for treatment. However, all three alternatives include monitoring that would provide the data needed for proper management of the remedial processes and a mechanism to address any potential impacts to the community, remediation workers, and the environment. Risk from exposure to groundwater during excavation would also require management via occupational health and safety controls.

Groundwater monitoring and discharge of treated groundwater will have minimal impact on workers responsible for periodic sampling. The time required for implementation of Alternative 4 is estimated at 6 – 9 months. Alternatives 2 and 3 are estimated to take about 9 – 12 months to implement.

RAOs would be achieved in Alternatives 3, 2, and 4 within short, medium and longer time frames, respectively. In-well air stripping is expected to achieve groundwater RAOs within five to 20 years under Alternative 3. Enhanced bioremediation is expected to achieve RAOs within eight to 50 years under Alternative 2, and groundwater pump and treat technology is expected to achieve groundwater RAOs in 30 or more years under Alternative 4. The time frame to meet groundwater RAOs in the non-active remediation area where MNA/LTM would be implemented is difficult to predict, but is expected to exceed 30 years.

Implementability

Alternative 1 (No Action) would be the easiest both technically and administratively to implement, as no work would be performed at the Site to address groundwater contamination. Alternatives 2, 3, and 4 rely on well established technologies that have commercially available equipment and are implementable. All three of these alternatives have access challenges that would have to be addressed with property owners. Of the three alternatives, Alternative 4, Groundwater Pump and Treat, is the easiest to construct at the Site and would require the least amount of street closure issues and would require less land and disruption in residential areas. Alternatives 2 and 3 would be moderately difficult to construct in the residential areas, requiring securing access to homes and obtaining street closure permits. The need to reconfigure the treatment injection and in-well air stripping well locations in Alternatives 2 and 3 because of access constraints may be necessary; however, doing so potentially impacts the effectiveness and schedule of these remedial alternatives.

Alternatives 2, 3, and 4 would require routine groundwater quality, performance and administrative monitoring. Alternatives 3 and 4 require periodic system maintenance (e.g., substrate injection, GAC replacement) for the life of the treatment.

Cost

The present-worth costs for Alternatives 1 through 4 are calculated using a discount rate of 7 percent and a 30-year time interval.

The estimated capital, annual O&M, and present-worth costs for each of the alternatives are presented in the table below.

Alternative	Capital Cost	Annual O&M Cost	Present Worth Cost
1	\$0	\$0	\$0
2	\$4,344,000	\$835,000	\$15,830,000
3	\$7,730,000	\$730,000	\$16,710,000
4	\$2,997,000	\$1,185,000	\$21,560,000

Alternative 1 (No Action) would have no costs associated with it because no activities would be implemented. Alternative 4 is the most costly remedy with a present-worth cost of approximately \$21.6 million. The approximate present-worth cost for Alternative 2 is \$15.8 million and \$16.7 million for Alternative 3.

State Acceptance

NYSDEC concurs with the selected remedy; a letter of concurrence is attached (see Appendix IV).

Community Acceptance

Comments received during the public comment period indicate that the public generally supports the selected remedy. These comments are summarized and addressed in the Responsiveness Summary, which is attached as Appendix V to this document.

PRINCIPAL THREAT WASTE

The NCP establishes an expectation that EPA will use treatment to address the principal threats posed by a site wherever practicable (NCP Section 300.430 (a)(1)(iii)(A)). The “principal threat” concept is applied to the characterization of “source materials” at a Superfund site. A source material is material that includes or contains hazardous substances, pollutants, or contaminants that act as a reservoir for the migration of contamination to groundwater, surface water, or air, or act as a source for direct exposure. Principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained or would present a significant risk to human health or the environment should exposure occur. The decision to treat these wastes is made on a site-specific basis through a detailed analysis of alternatives, using the remedy selection criteria which are described above. The manner in which principal threats are addressed provides a basis for making a statutory finding that the remedy employs treatment as a principal element.

The contamination being addressed in this operable unit is in the groundwater, and while no definitive evidence was found during the remedial investigation which indicates that non-aqueous phase liquids are present within the aquifers (the potential does exist that principal threat wastes could exist at the Site based on the elevated concentrations of PCE detected at several sampling locations during the RI). The locations of high COC concentrations will be addressed through the groundwater extraction and treatment and/or targeted in-situ chemical treatment.

SELECTED REMEDY

Summary of the Rationale for the Selected Remedy

Based upon consideration of the requirements of CERCLA, the detailed analysis of the alternatives, and public comments, EPA has determined that Alternative 4, Groundwater Pump and Treat, best satisfies the requirements of CERCLA Section 121, 42 U.S.C. §9621, and provides the best balance of tradeoffs among the remedial alternatives with respect to the NCP's nine evaluation criteria, 40 CFR § 300.430(e)(9).

EPA is proposing Alternative 4 because of the difficulty in implementing Alternatives 2 and 3 in the densely-populated and fully-developed residential and commercial setting of the Site. Alternative 2, and Alternative 3 to a somewhat lesser degree, would require securing access to a significant number of residential properties to perform construction activities. Under Alternatives 2 and 3, access would be necessary to the residential properties for an extended period to perform the initial construction activities and to subsequently conduct monitoring. Under Alternative 2, multiple injections are likely to be necessary over time. These activities would cause a significant disturbance to the residential neighborhood. Reconfiguration of the injection or in-well stripping wells because of access constraints could potentially impact significantly the effectiveness of the technology. Access to install extraction wells under the preferred remedy, Alternative 4, Groundwater Pump and Treat, though still complicated, is more manageable. Access to property and construction of a treatment plant is expected to be performed in an area zoned for commercial activity. Furthermore, the uncertainty of an unknown source investigation that could result in a continued migration of contamination from source areas adds to the uncertainty that the remedial action objectives would be achieved with Alternative 2.

Alternative 4, Groundwater Pump and Treat, uses proven technologies that can be more readily implemented than the other alternatives. The treatment components can be expanded to improve treatment effectiveness or decrease the remedial time frame, if required. Groundwater Pump and Treat has been demonstrated as an effective remedial approach for contaminant mass removal over the long term. This approach would be particularly effective as the contaminant plumes are relatively accessible and have a specific configuration. The shallow UGA groundwater (0 to 20 feet bgs) PCE plume is approximately 3,500 feet long and between 400 and 100 feet wide. The deep groundwater plume is approximately 1,110 feet long. Groundwater Pump and Treat would also be the most effective of the alternatives in establishing hydrodynamic control of the aquifer to minimize off-site migration of contaminants and isolate the contaminated groundwater area. The prevention of migration would limit CVOC contamination from flowing toward the LIAWC well field. Long-term groundwater monitoring would ensure that remedial action objectives are achieved at the Site.

Although the preferred remedy is more expensive than either Alternatives 2 or 3, there is a greater degree of uncertainty that the remedial action objectives would be achieved by either Alternative 2 or 3. Based on the Site conditions, Alternative 4, Groundwater Pump and Treat, is the most effective of the alternatives.

The addition of in-situ chemical treatments targeting areas containing high concentrations of PCE that may reside outside the radius of influence of the pump within the inferred plume, as appropriate, in combination with groundwater extraction could potentially reduce the remediation time frames by reducing the contaminant mass of PCE, and, therefore, the costs of this alternative.

EPA, in conjunction with NYSDEC, believes that the selected remedy would be protective of human health and the environment, provide the greatest long-term effectiveness, comply with ARARs, and be cost-effective among alternatives with respect to the evaluation criteria. The selected remedy best satisfies the requirements of CERCLA Section 121, 42 U.S.C. §9621, and provides the best balance of tradeoffs among the remedial alternatives with respect to the NCP's nine evaluation criteria set forth at 40 CFR § 300.430(e)(9). The selected remedy also will meet the statutory preference for the use of treatment as a principal element.

Description of the Selected Remedy

The selected remedy to address the contaminated groundwater includes the following components:

- Extraction of the groundwater via pumping and ex-situ treatment of the extracted groundwater prior to discharge to a POTW or surface water, or reinjection to the aquifer (to be determined during design); in-situ chemical treatment of targeted high concentration contaminant areas, as appropriate; monitored natural attenuation for the areas where active remediation is not performed; and long-term monitoring in conjunction with implementation of institutional controls. In addition, EPA will continue to evaluate the potential for vapor intrusion at the Site, and it will install vapor mitigation systems, where necessary and appropriate.
- A groundwater extraction well network designed to effectuate removal of the contaminant mass from the groundwater plume and establish hydrodynamic control of the plume. Figures 10 and 11 provide the conceptual pump and treat well locations within the shallow and deep UGA plume areas. The exact number of extraction wells and their placement will be determined in the remedial design. An aquifer pump test would be conducted as part of the pre-remedial design to collect necessary aquifer data necessary to complete the design of the groundwater pump and treat system.
- The use of in-situ chemical treatments, targeting areas containing high concentrations of PCE that may reside outside the radius of influence of the pumping wells within the inferred plume, as appropriate, in combination with groundwater extraction. This could reduce the remediation time frames and the cost of this alternative. The implementation of in-situ chemical treatment (e.g. ISCO, ISCR) will be designed to enhance the remediation of the contaminated groundwater in conjunction with the pump and treat system. The remedial design will determine how best to execute the ISCR or ISCO with the pump and treat system.

- A treatment plant with the capacity to achieve the mass removal and hydraulic control objectives of the remedy constructed within or nearby the area of the plume. EPA estimates that a capacity of 350 gallons per minute may be required. The extracted groundwater would be treated for CVOC removal with either liquid phase GAC or air stripping, or both. Treated groundwater effluent will be discharged to a POTW or surface water, or reinjected to groundwater. The method of discharge will be determined in the remedial design. The design of the treatment facility will take discharge requirements into account.
- The pump and treat system will operate until MCLs are attained in the shallow and deep UGA where active remediation is employed. The FS presents calculations determining the duration of the operation of the extraction system. These calculations to determine the remedial time frame require additional data regarding contaminant mass flux, as well as more detailed process design to determine the actual number of recovery/injection wells and pore volumes of clean water required to reach RAOs. This data will be collected during the pre-remedial design phase. EPA assumes the duration of this alternative is 30 years or more.
- The environmental benefits of the preferred remedy may be enhanced by consideration, during the design, of technologies and practices that are sustainable in accordance with EPA Region 2's Clean and Green Policy. This will include consideration of green remediation technologies and practices, including GAC regeneration.
- Monitored natural attenuation as a necessary component in those areas where active remediation is not anticipated, such as the areas of lower contaminant concentrations at edges of the contaminant plume.

A Site Management Plan will also be developed and will provide for the proper management of the Site remedy post-construction, such as through the use of institutional controls, and will also include:

- Monitoring of Site groundwater to ensure that, following remedy implementation, the groundwater quality improves. A long-term groundwater monitoring program would be implemented to track and monitor changes in the groundwater contamination and ensure the remedial action objectives are attained. The results from the long-term monitoring program will be used to evaluate the migration and changes in the contaminant plume over time. The long-term monitoring program will be modified accordingly. The SMP will also include provisions for any operation and maintenance required for the remedy; and
- Periodic certifications by the owner/operator or other person implementing the remedy that any institutional and engineering controls are in place.

The groundwater monitoring well sample results will also be used to track changes in the contaminant plume in order to determine homes considered “at risk” for vapor intrusion. Access would be sought to those selected structures/homes determined to be “at risk” and sampled periodically for vapor intrusion during the winter heating season. Vapor intrusion caused by volatilization from the groundwater contaminant plume has already been monitored at 15 homes; one of these homes has been outfitted with a vapor mitigation system. Vapor extraction systems would be installed at additional homes, if future sampling results indicate such systems are warranted. Institutional controls are incorporated into this remedy for protection of human health and the environment over the long term. EPA anticipates using existing governmental controls to prevent use of groundwater and informational and or governmental controls to ensure that vapor intrusion issues are identified to the public.

While this alternative will ultimately result in reduction of contaminant levels in groundwater to levels that would allow for unlimited use and unrestricted exposure, it will take longer than five years to achieve these levels. As a result, in accordance with EPA policy, the Site is to be reviewed at least once every five years.

Summary of the Estimated Selected Remedy Costs

The estimated capital, annual O&M, and total present-worth costs (using the federal standard 7% discount rate) for the selected remedy are \$2,997,000, \$1,185,000, and \$21,560,000, respectively. Appendix II, Table 14 provides the basis for the cost estimates for Alternative 4.

It should be noted that these cost estimates are order-of-magnitude engineering cost estimates that are expected to be within +50 to -30 percent of the actual project cost. These cost estimates are based on the best available information regarding the anticipated scope of the selected remedy. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedy.

Expected Outcomes of the Selected Remedy

The selected remedy addresses the contamination in the groundwater. The results of the risk assessment indicate that the hypothetical future use of the groundwater at the Site will pose an unacceptable increased future cancer risk and an unacceptable non-cancer hazard risk to human health. Under the selected alternative, a groundwater pump and treatment technology will be used to remediate contaminated groundwater and will restore the aquifer at the Site as a potential source of drinking water in a reasonable period by reducing contaminant levels to the federal and state MCLs.

Cleanup levels for the chemicals of concern are presented in Appendix II, Table 12. Achieving the cleanup levels will restore the aquifer to its beneficial use.

It is estimated that it will take 30 years to achieve the groundwater cleanup objectives under the selected remedy. If potential source areas are identified and addressed under OU2, the time it takes to achieve the cleanup levels within the aquifer at the Site may be reduced.

STATUTORY DETERMINATIONS

Under CERCLA Section 121 and the NCP, the lead agency must select remedies that are protective of human health and the environment, comply with ARARs (unless a statutory waiver is justified), are cost-effective, and utilize permanent solutions and alternative treatment technologies to the maximum extent practicable. Section 121(b)(1) also establishes a preference for remedial actions which employ treatment to permanently and significantly reduce the volume, toxicity, or mobility of the hazardous substances, pollutants, or contaminants at a Site.

For the reasons discussed below, EPA has determined that the selected remedy meets these statutory requirements.

Protection of Human Health and the Environment

The results of the risk assessment indicate that, if no action is taken, the hypothetical future use of the groundwater at the Site will pose an unacceptable increased future cancer risk and an unacceptable non-cancer hazard risk to human health. The selected remedy will be protective of human health and the environment, and it will restore groundwater quality at the Site to drinking-water standards over the long term. Combined with institutional controls, the selected remedy will provide protectiveness of human health and the environment over both the short and long term.

Compliance with ARARs and Other Environmental Criteria

A summary of the ARARs and “Other Criteria, Advisories, or Guidance TBCs” which will be complied with during implementation of the selected remedy is presented below.

- Clean Air Act, National Ambient Air Quality Standards (40 CFR 50)
- Groundwater Quality Regulations (6 NYCRR Parts 700-705)
- National Primary Drinking Water Standards (MCLs and non-zero maximum contaminant level goals) (40 CFR 141)
- National Environmental Policy Act (40 CFR 1500 to 1508)
- National Emissions Standards for Hazardous Air Pollutants (40 CFR Parts 51, 52, 60, and 61)
- New York State Department of Health Drinking Water Standards (10 NYCRR Part 5)
- New York State Regulations for Prevention and Control of Air Contamination and Air Pollution (6 NYCRR Part 200)

- New York State Drinking Water Standards (NYCRR Part 5)
- New York State Air Cleanup Criteria, January 1990
- New York State Department of Environmental Conservation Guidelines for the Control of Toxic Ambient Air Contaminants, DAR-1, November 12, 1997
- New York Air Quality Standards (6 NYCRR Part 257)
- New York State Department of Environmental Conservation, Technical and Operational Guidance Series 1.1.1, November 1991
- Safe Drinking Water Act Proposed MCLs and nonzero MCL Goals

Cost-Effectiveness

A cost-effective remedy is one where costs are proportional to the overall effectiveness (NCP Section 300.430(f)(1)(ii)(D)). Overall effectiveness is based on the evaluation of: long-term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short-term effectiveness. Based on the comparison of overall effectiveness (discussed above) to cost, the selected remedy meets the statutory requirement that Superfund remedies be cost-effective in that, even though it is the most costly of the alternatives considered, it is expected to be much more readily implementable than the other alternatives and will achieve the remediation goals in a reasonable time frame.

Each of the alternatives underwent a detailed cost analysis. In that analysis, capital and annual O&M costs were estimated and used to develop present-worth costs. In the present-worth cost analysis, annual O&M costs were calculated for the estimated life of each alternative using a 7% discount rate. The estimated present-worth cost of the selected remedy, using a 30-year time interval, is \$21,560,000.

While it is estimated that Alternatives 2 and 3 will achieve the groundwater cleanup objectives and provide the same degree of protection of human receptors, the selected alternative is the most implementable of the alternatives and will result in the restoration of water quality in the aquifer much more effectively than the other alternatives.

Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

The selected remedy provides the best balance of tradeoffs among the alternatives with respect to the balancing criteria set forth in NCP Section 300.430(f)(1)(i)(B), such that it represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a practicable manner at the Site. The selected remedy satisfies the criteria for long-term effectiveness and permanence by removing contaminant mass from areas of the aquifer with elevated PCE concentrations. In addition to being the most effective in reducing the mobility of groundwater contamination by providing hydraulic control of the plume, the combination of groundwater extraction and treatment and in-situ treatment will permanently reduce the

mass of contaminants in the groundwater, thereby reducing the toxicity, mobility, and volume of contamination.

The selected remedy presents a higher short-term risk compared with Alternative 2 because of the above-ground treatment components and infrastructure that may create a noise nuisance and inconvenience for local residents during construction. In addition, the selected remedy could increase the risks of exposure, ingestion, and inhalation of contaminants by workers and the community because contaminated groundwater would be extracted to the surface for treatment. However, measures would be implemented, through the development of a health and safety plan and a quality of life plan, to mitigate these short-term risks.

The selected remedy is implementable since it employs standard technologies that are readily available and allows flexibility to use in-situ chemical treatments to enhance the remediation of the contaminated groundwater in conjunction with the pump and treat system.

Preference for Treatment as a Principal Element

By using a combination of groundwater extraction and treatment, which is an ex-situ treatment process, as well as the use of in-situ chemical treatments which target areas containing high concentrations of PCE that may reside outside the radius of influence of the pumping wells within the inferred plume, as appropriate, the selected remedy satisfies the statutory preference for remedies that employ treatment as a principal element.

Five-Year Review Requirements

The selected remedy will not result in contaminated groundwater remaining on-site above levels that allow for site unlimited use and unrestricted exposure, although it is likely that the selected remedy may take more than five years to attain the cleanup levels. Therefore, a policy review may be conducted within five years of construction of the OU1 remedy to ensure that the remedy is, or will be, protective of human health and the environment.

DOCUMENTATION OF SIGNIFICANT CHANGES

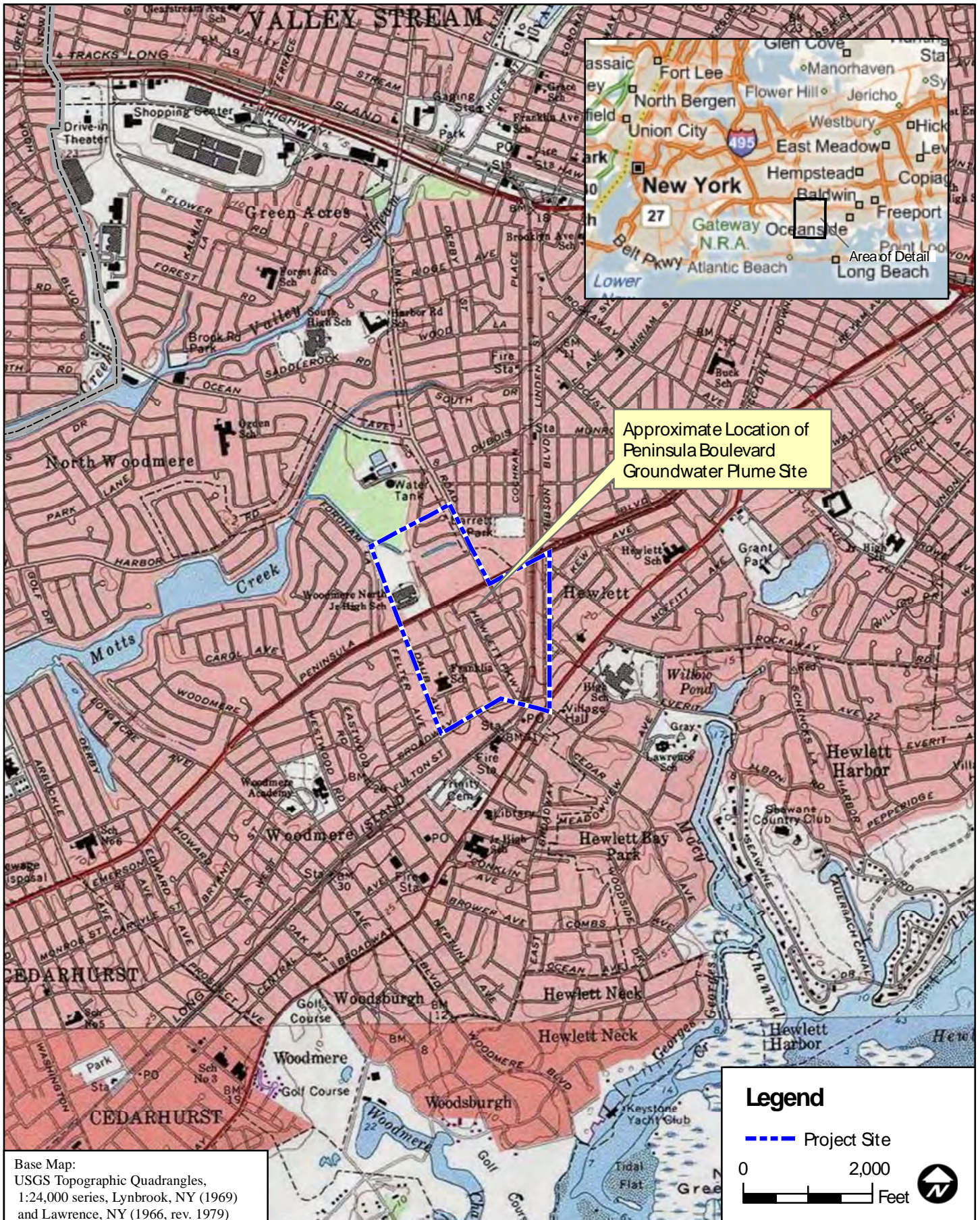
The Proposed Plan, released for public comment on July 28, 2011, identified Alternative 4, Groundwater Pump and Treat, as the preferred groundwater remedy. Based upon its review of the written and oral comments submitted during the public comment period, EPA has determined that no significant changes to the remedy, as originally identified in the Proposed Plan, are necessary or appropriate.

**PENINSULA BOULEVARD GROUNDWATER PLUME
SUPERFUND SITE**

RECORD OF DECISION

APPENDIX I

FIGURES



Job No.	Date	Figure No.
112840	03/17/11	1

500049



HDR

Hempstead, Durham & Richmond, Architects and Engineers, P.C. In Association with HDR Engineering, Inc.

1	02-01-11	DRAFT ISSUE
ISSUE	DATE	DESCRIPTION

PROJECT MANAGER	MM
LEAD DESIGN PROF	MM
DESIGN ENGINEER	JJ
DRAWN BY	JW, SS
PROGRAM MANAGER	BW
QUALITY ASSURANCE MGR	CZ
PROJECT NUMBER	147-112840

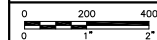
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

CONTRACT NO. EP-W-09-009
WORK ASSIGNMENT NO. 002-RICO-02TV

PENINSULA BOULEVARD
GROUNDWATER PLUME RI

TOWN OF HEMPSTEAD, VILLAGE OF HEWLETT,
NASSAU COUNTY, NEW YORK

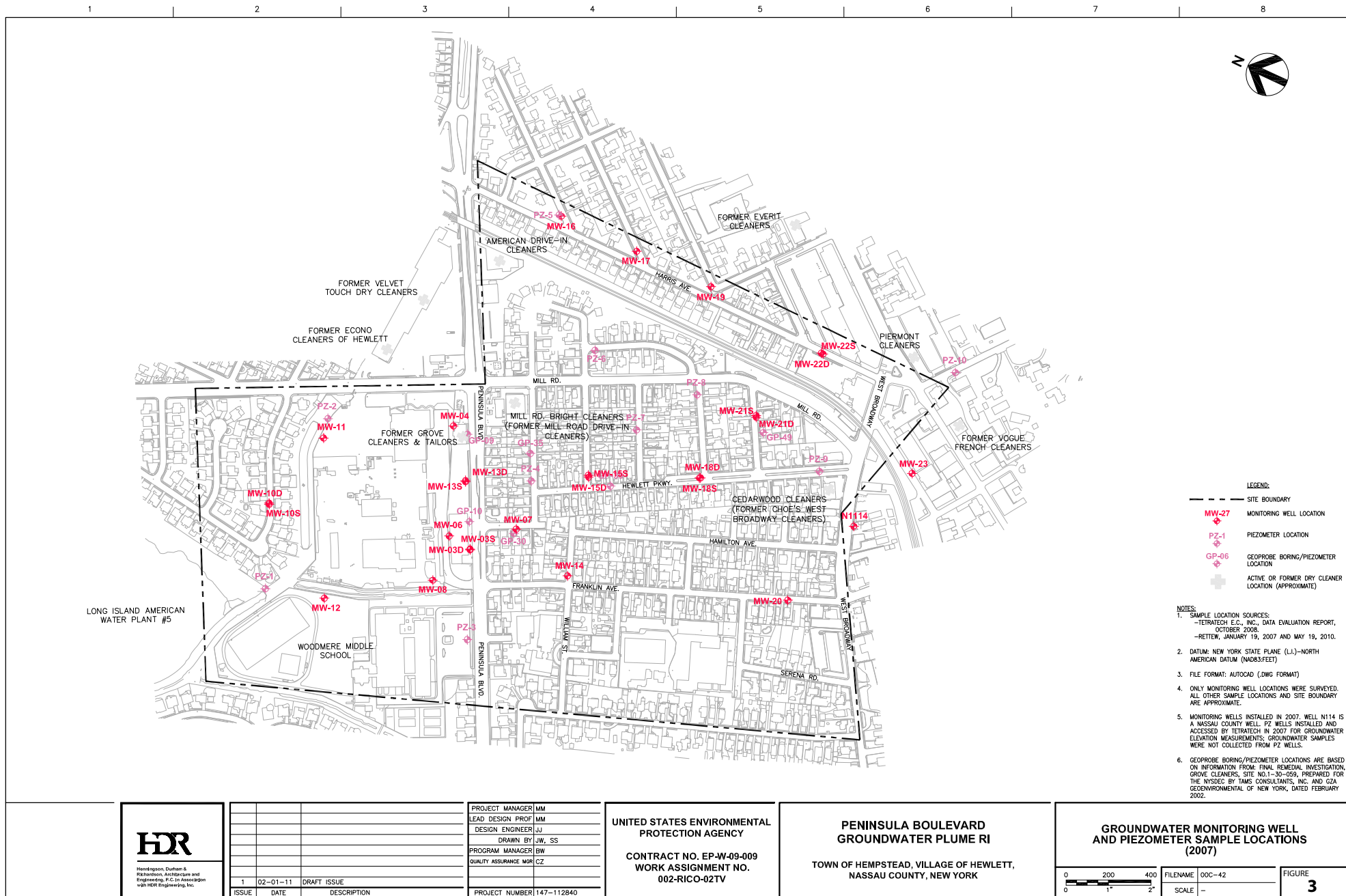
MEMBRANE INTERFACE PROBE AND
HYDROPUNCH SAMPLE LOCATIONS
(2006, 2007)

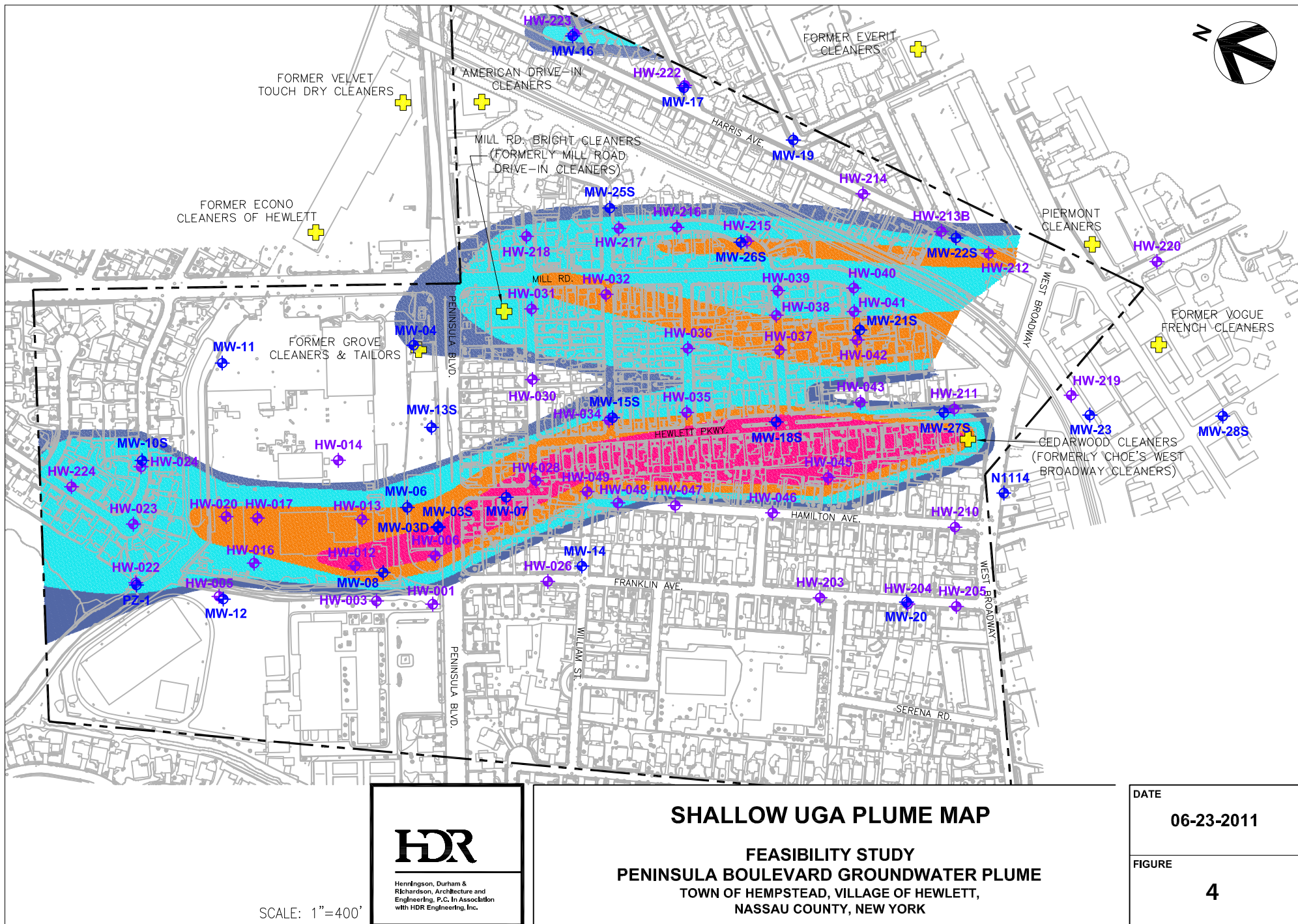


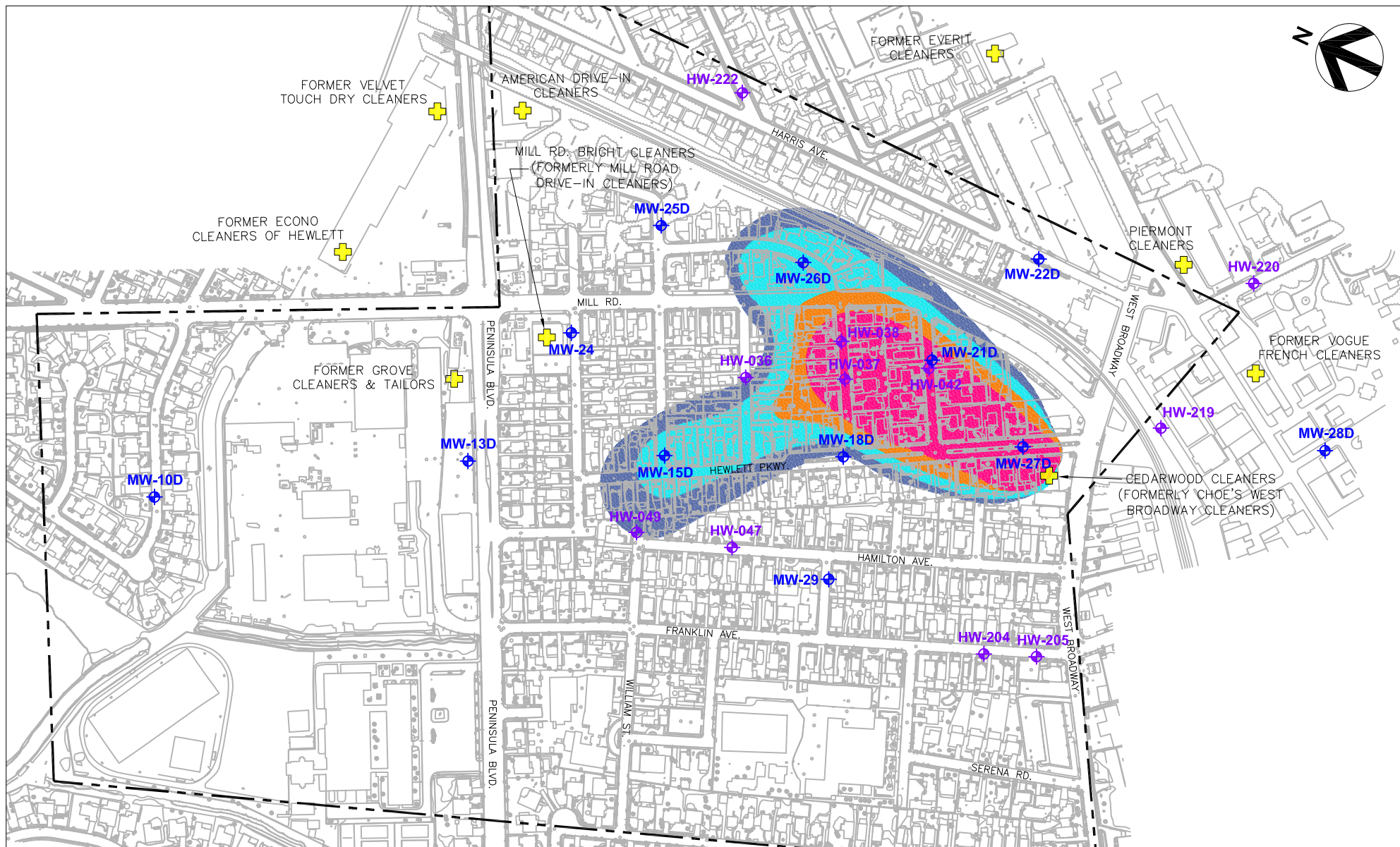
FILENAME	00C-02-07
SCALE	---

FIGURE
2

500050







SCALE: 1"=400'

HDR

Henningson, Durham &
Richardson, Architecture and
Engineering, P.C. In Association
with HDR Engineering, Inc.

DEEP UGA PLUME MAP

FEASIBILITY STUDY
PENINSULA BOULEVARD GROUNDWATER PLUME
TOWN OF HEMPSTEAD, VILLAGE OF HEWLETT,
NASSAU COUNTY, NEW YORK

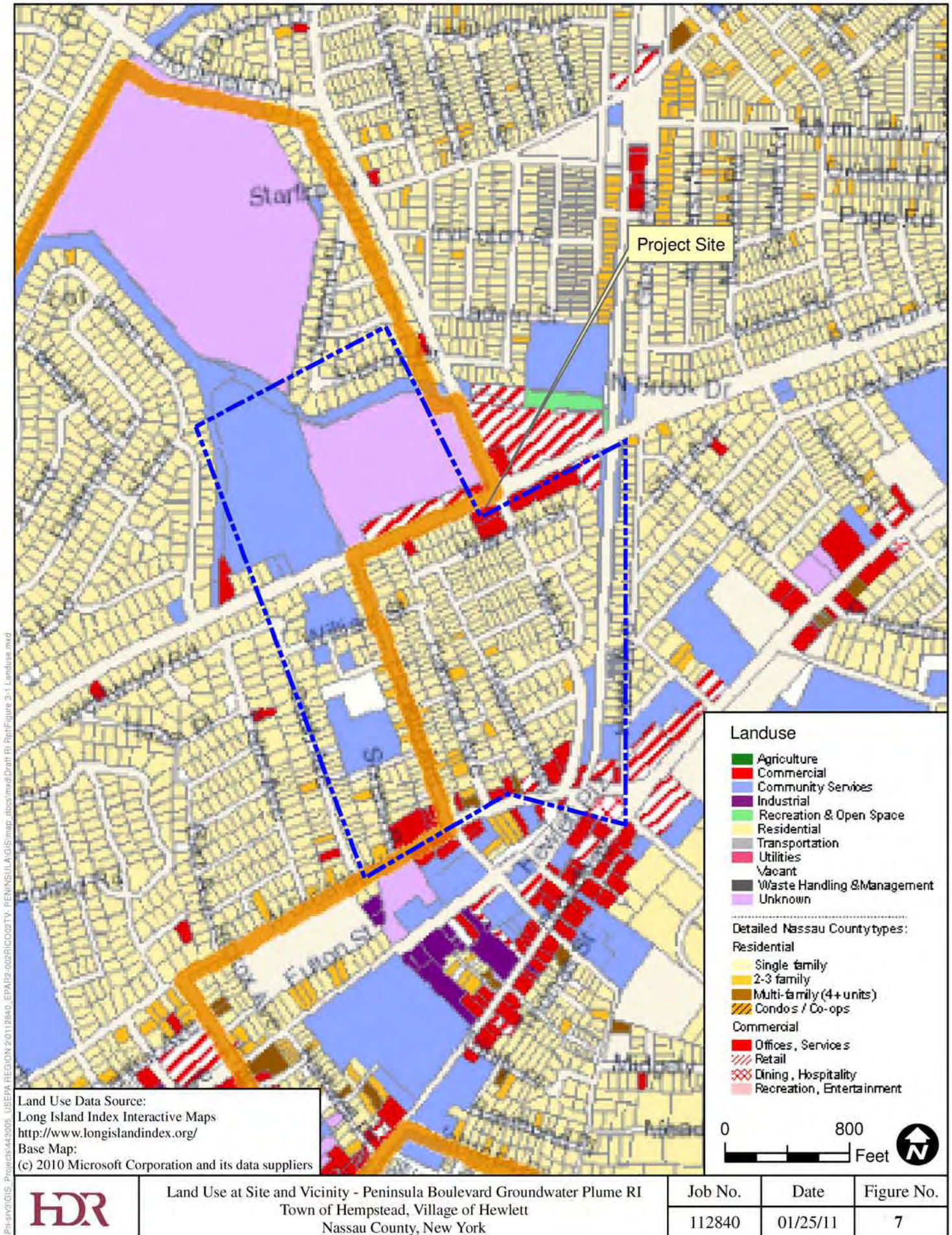
DATE

06-23-2011

FIGURE

5

500053



I:\p\sh\GIS - Projects\412005 - USEPA REGION 2\0112840 - EPA\22-002\RIC022\TV - PENINSULA\GIS\map_docs\mxd\Draw RI Rpt\Figure 3-1_Landuse.mxd

Land Use Data Source:
Long Island Index Interactive Maps
<http://www.longislandindex.org/>
Base Map:
(c) 2010 Microsoft Corporation and its data suppliers

Landuse

- Agriculture
- Commercial
- Community Services
- Industrial
- Recreation & Open Space
- Residential
- Transportation
- Utilities
- Vacant
- Waste Handling & Management
- Unknown

Detailed Nassau Countytypes:
Residential

- Single family
- 2-3 family
- Multi-family (4+ units)
- Condos / Co-ops

Commercial

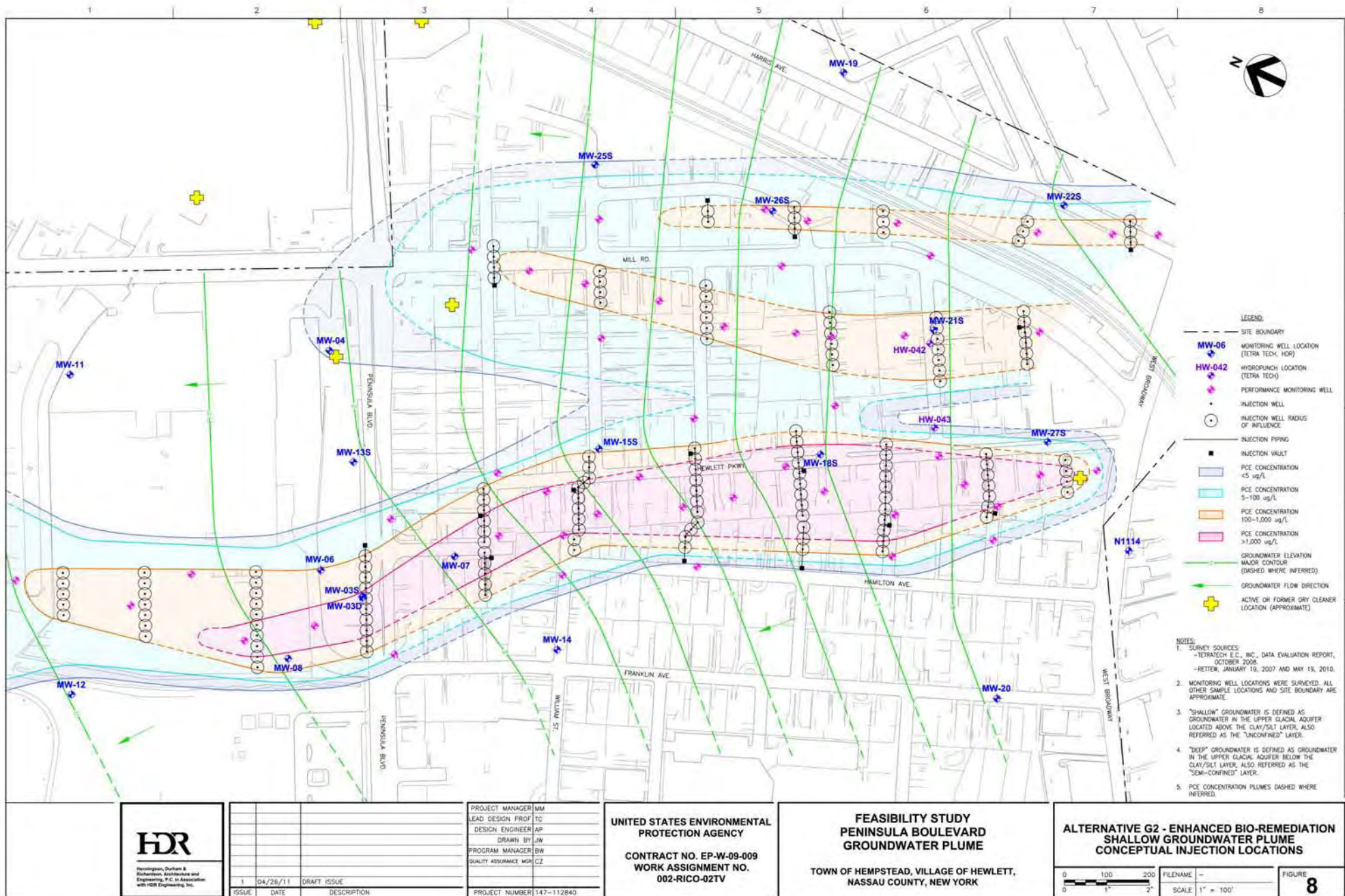
- Offices, Services
- Retail
- Dining, Hospitality
- Recreation, Entertainment

0 800 Feet

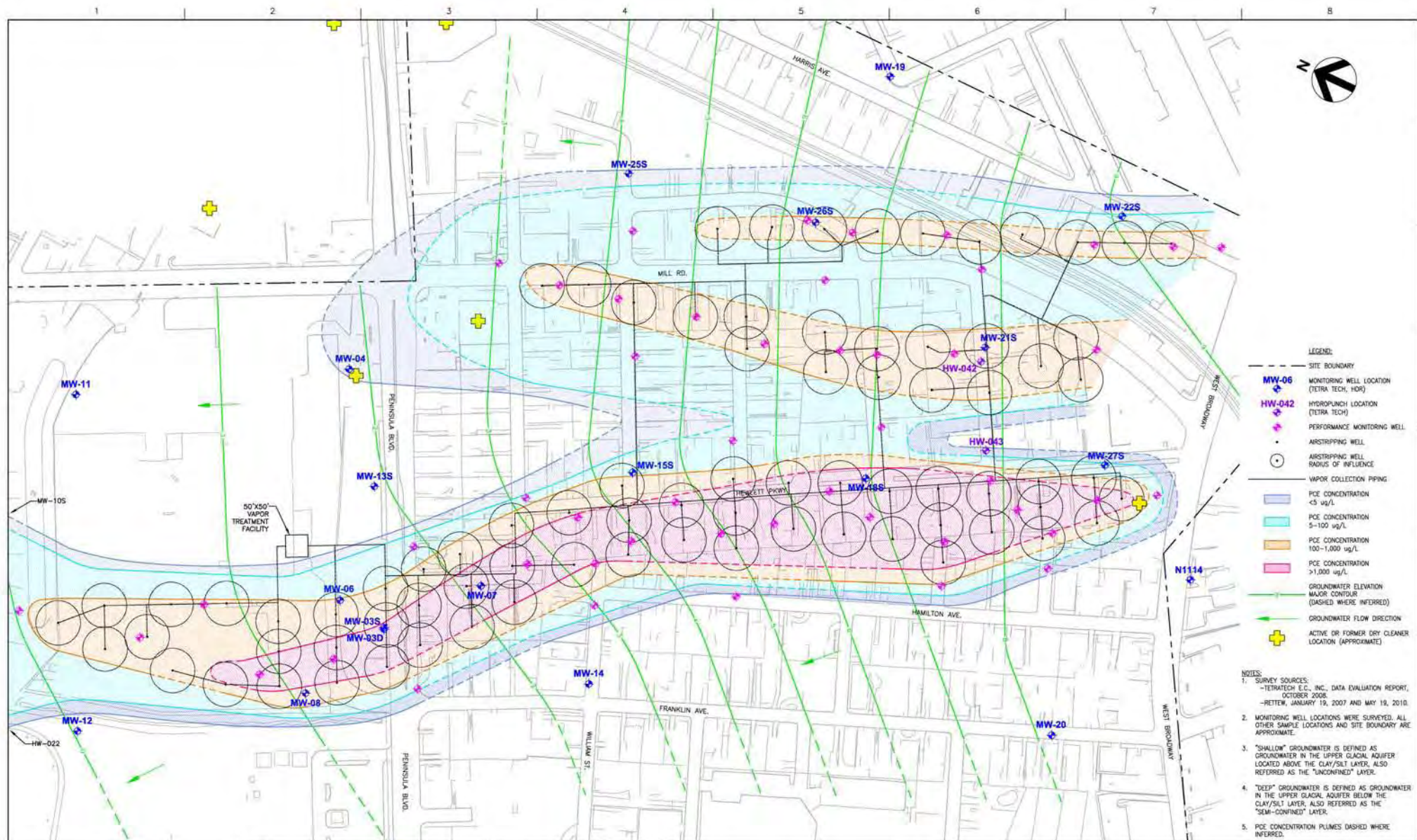


Land Use at Site and Vicinity - Peninsula Boulevard Groundwater Plume RI
Town of Hempstead, Village of Hewlett
Nassau County, New York

Job No.	Date	Figure No.
112840	01/25/11	7



500056



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with HDR Engineering, Inc.

ISSUE	DATE	DESCRIPTION
1	04/26/11	DRAFT ISSUE

PROJECT MANAGER MM
LEAD DESIGN PROF TC
DESIGN ENGINEER AP
DRAWN BY JW
PROGRAM MANAGER BW
QUALITY ASSURANCE MGR CZ

PROJECT NUMBER 147-112840

UNITED STATES ENVIRONMENTAL
PROTECTION AGENCY

CONTRACT NO. EP-W-09-009
WORK ASSIGNMENT NO.
002-RICO-02TV

FEASIBILITY STUDY
PENINSULA BOULEVARD
GROUNDWATER PLUME

TOWN OF HEMPSTEAD, VILLAGE OF HEWLETT,
NASSAU COUNTY, NEW YORK

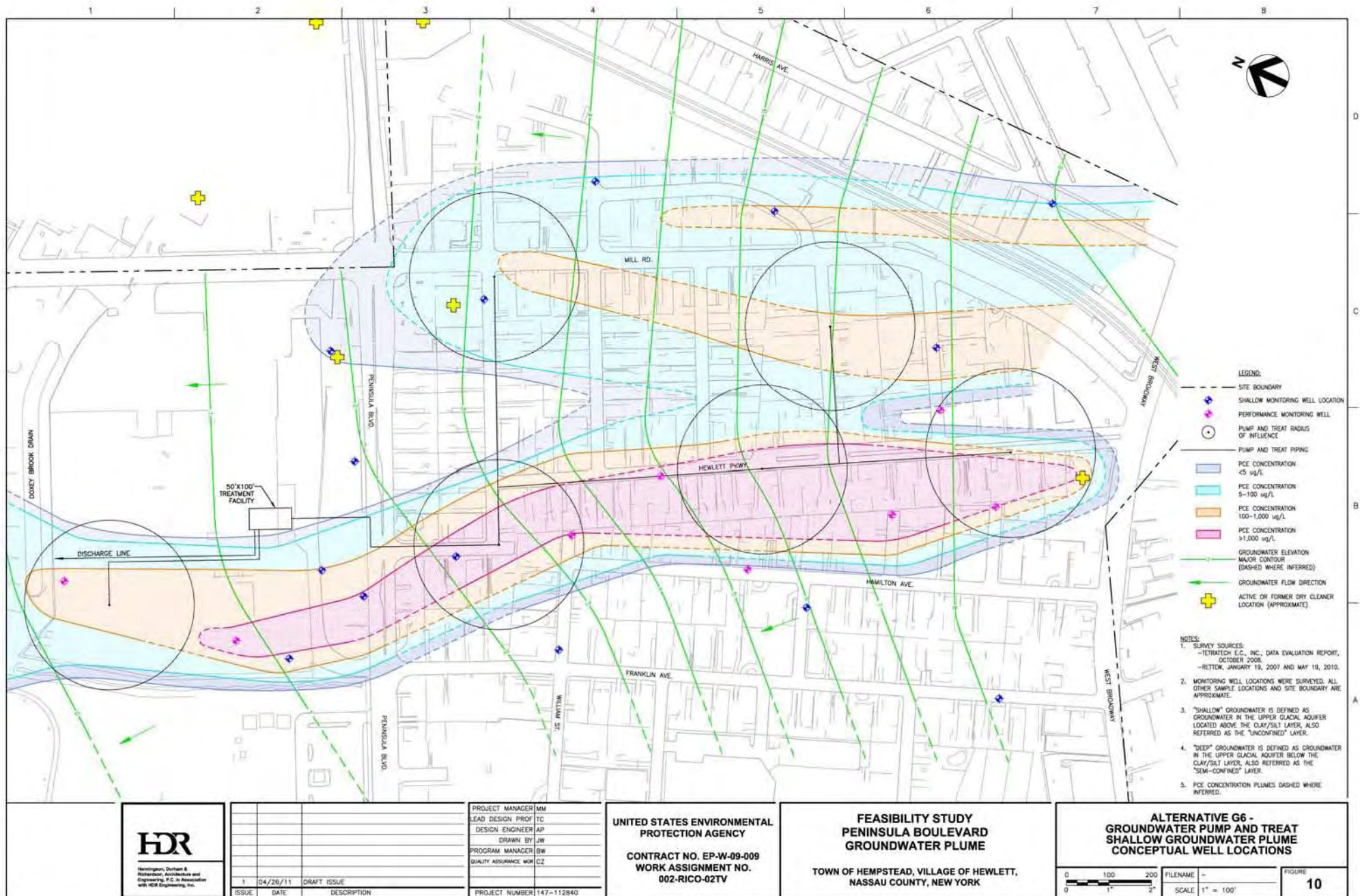
ALTERNATIVE G4 - IN-WELL AIR STRIPPING
SHALLOW GROUNDWATER PLUME
CONCEPTUAL WELL LOCATIONS

0 100 200
0 1" 2"

FILENAME -
SCALE 1" = 100'

FIGURE
9

500057



HDR

Hempstead, Durham & Associates, Architecture and Engineering, P.C. in Association with HDR Engineering, Inc.

PROJECT MANAGER	MM
LEAD DESIGN PROF	TC
DESIGN ENGINEER	AP
DRAWN BY	JW
PROGRAM MANAGER	BW
QUALITY ASSURANCE MGR	CZ
PROJECT NUMBER	147-112840

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

CONTRACT NO. EP-W-09-009
WORK ASSIGNMENT NO. 002-RICO-02TV

FEASIBILITY STUDY PENINSULA BOULEVARD GROUNDWATER PLUME

TOWN OF HEMPSTEAD, VILLAGE OF HEWLETT,
NASSAU COUNTY, NEW YORK

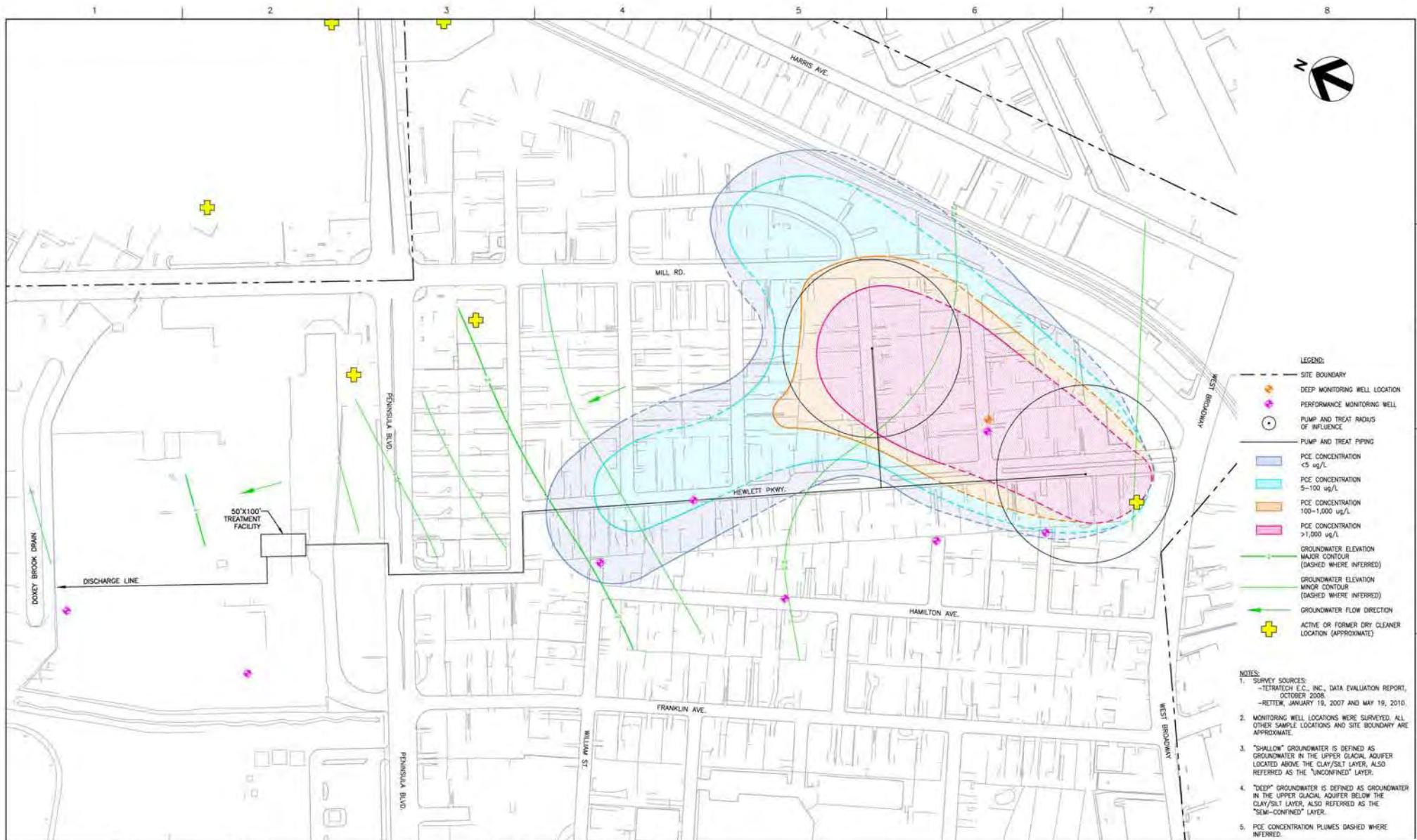
ALTERNATIVE G6 - GROUNDWATER PUMP AND TREAT SHALLOW GROUNDWATER PLUME CONCEPTUAL WELL LOCATIONS

0 100 200
0 1" 2"

FILENAME -
SCALE 1" = 100'

FIGURE
10

500058



LEGEND:

- SITE BOUNDARY
- ✚ DEEP MONITORING WELL LOCATION
- ✚ PERFORMANCE MONITORING WELL
- PUMP AND TREAT RADIUS OF INFLUENCE
- PUMP AND TREAT PIPING
- PCE CONCENTRATION <5 ug/L
- PCE CONCENTRATION 5-100 ug/L
- PCE CONCENTRATION 100-1,000 ug/L
- PCE CONCENTRATION >1,000 ug/L
- GROUNDWATER ELEVATION MAJOR CONTOUR (DASHED WHERE INFERRED)
- GROUNDWATER ELEVATION MINOR CONTOUR (DASHED WHERE INFERRED)
- GROUNDWATER FLOW DIRECTION
- ✚ ACTIVE OR FORMER DRY CLEANER LOCATION (APPROXIMATE)

NOTES:

1. SURVEY SOURCES:
--TETRA TECH E.C., INC., DATA EVALUATION REPORT, OCTOBER 2008.
--HETTER, JANUARY 19, 2007 AND MAY 19, 2010.
2. MONITORING WELL LOCATIONS WERE SURVEYED. ALL OTHER SAMPLE LOCATIONS AND SITE BOUNDARY ARE APPROXIMATE.
3. "SHALLOW" GROUNDWATER IS DEFINED AS GROUNDWATER IN THE UPPER GLACIAL AQUIFER LOCATED ABOVE THE CLAY/SILT LAYER, ALSO REFERRED AS THE "UNCONFINED" LAYER.
4. "DEEP" GROUNDWATER IS DEFINED AS GROUNDWATER IN THE UPPER GLACIAL AQUIFER BELOW THE CLAY/SILT LAYER, ALSO REFERRED AS THE "SEMI-CONFINED" LAYER.
5. PCE CONCENTRATION PLUMES DASHED WHERE INFERRED.

HDR

Huntington, Durham &
Richardson, Architecture and
Engineering, P.C. in Association
with HDR Engineering, Inc.

ISSUE	DATE	DESCRIPTION
1	04/26/11	DRAFT ISSUE

PROJECT MANAGER MW
LEAD DESIGN PROF. TC
DESIGN ENGINEER AP
DRAWN BY JW
PROGRAM MANAGER BW
QUALITY ASSURANCE MGR CZ

PROJECT NUMBER 147-112840

UNITED STATES ENVIRONMENTAL
PROTECTION AGENCY

CONTRACT NO. EP-W-09-009
WORK ASSIGNMENT NO.
002-RICO-02TV

FEASIBILITY STUDY
PENINSULA BOULEVARD
GROUNDWATER PLUME

TOWN OF HEMPSTEAD, VILLAGE OF HEWLETT,
NASSAU COUNTY, NEW YORK

ALTERNATIVE G6 -
GROUNDWATER PUMP AND TREAT
DEEP GROUNDWATER PLUME
CONCEPTUAL WELL LOCATIONS

0 100 200
0 1" 2"

FILENAME -
SCALE 1" = 100'

FIGURE
11

500059

**PENINSULA BOULEVARD GROUNDWATER PLUME
SUPERFUND SITE**

RECORD OF DECISION

APPENDIX II

TABLES

Table 1 Summary Of Maximum Concentrations in Groundwater above Groundwater Quality Standards	
Chemical	Concentration
Benzene	150 µg/l
Cis-1,2-DCE	9,400 µg/l
Ethylbenzene	17 µg/l
Isopropylbenzene	7.2 µg/l
PCE	30,000 µg/l
TCE	10,000 µg/l
Vinyl chloride	59 µg/l
Acenaphthene	22 µg/l
bis(2-ethylhexyl)phthalate	5.1 µg/l
Fluoranthene	1.3 µg/l
Fluorene	13 µg/l
Naphthalene	4.3 µg/l
Phenanthrene	1.4 µg/l
Dieldrin -	0.039 µg/l
Chromium	170 mg/l
Iron	42,000 mg/l
Manganese	1,100 mg/l
Nickel	110 mg/l
Sodium	340,000 mg/l
Zinc	940 mg/l

Table 2
Analytical Results for Groundwater - 2007

Location ID	MW-03D	MW-03S	MW-04	MW-06
Sample ID	PB-GWMW3D-01	PB-GWMW3S-01	PB-GWMW4-01	PB-GWMW6-01
Sample Date	8/30/2007	8/30/2007	8/30/2007	8/29/2007
Chemical - ug/L				
1,1,1-Trichloroethane	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethane	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethene	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U
1,4-Dichlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U
Benzene	0.24 J	0.13 J	150	0.5 U
Carbon Disulfide	0.5 U	0.5 U	0.18 J	0.5 U
Chlorobenzene	0.5 U	0.5 U	0.36 J	0.5 U
Chloroform	0.5 U	0.5 U	0.5 U	0.5 U
Chloromethane	0.22 J	0.5 U	0.14 J	0.5 U
Cis-1,2-Dichloroethylene	27 J	7.7	2.3	0.85
Cyclohexane	0.5 U	0.5 U	25	0.5 U
Dimethyl Benzene	0.5 U	0.5 U	4.8	0.5 U
Ethylbenzene	0.5 U	0.5 U	17	0.5 U
Isopropylbenzene	0.5 U	0.5 U	7.2	0.5 U
Methylcyclohexane	0.5 U	0.5 U	17 J	0.5 U
Methylene Chloride	0.5 U	0.93	0.5 U	1.6
o-Xylene	0.5 U	0.5 U	1.2	0.5 U
Methyl tert-butyl ether (MTBE)	0.6	0.5 U	0.5 U	0.5 U
Tetrachloroethylene (PCE)	1,000	1,000	1.2	1.2
Toluene	0.5 U	0.5 U	3.3	0.5 U
Trans-1,2-Dichloroethene	0.5 U	0.5 U	0.5 U	0.5 U
Trichloroethylene (TCE)	38 J	10	0.75	0.25 J
Vinyl Chloride	0.5 U	0.5 U	1.8	0.5 U
2-Methylnaphthalene	5 U	5 U	1.1 J	5 U
Acenaphthene	5 U	5 U	22	5 U
Bis(2-ethylhexyl)phthalate	5 U	5 U	2 J	1.9 J
Carbazole	5 U	5 U	3.6 J	5 U
Dibenzofuran	5 U	5 U	11	5 U
Diethyl Phthalate	5 U	5 U	5 U	5 U

Table 2
Analytical Results for Groundwater - 2007

Location ID	MW-03D	MW-03S	MW-04	MW-06
Sample ID	PB-GWMW3D-01	PB-GWMW3S-01	PB-GWMW4-01	PB-GWMW6-01
Sample Date	8/30/2007	8/30/2007	8/30/2007	8/29/2007
Chemical - ug/L				
Fluoranthene	5 U	5 U	1.3 J	5 U
Fluorene	5 U	5 U	13	5 U
Naphthalene	5 U	5 U	4.3 J	5 U
Phenanthrene	5 U	5 U	1.4 J	5 U
Dieldrin	0.039 J	0.1 U	0.1 U	0.1 U
Aluminum	200 U	200 U	200 U	200 U
Arsenic	8 U	8 U	8 U	8 U
Calcium	47,000	45,000	71,000	40,000
Chromium	8.1	5 U	5 U	5 U
Copper	10 U	10 U	10 U	10 U
Iron	86	180	620	66
Magnesium	7,400	12,000	16,000	10,000
Manganese	750	560	90	20
Nickel	20 U	20 U	20 U	20 U
Potassium	5,100	5,100	4,400	3,100
Sodium	95,000	91,000	57,000	49,000
Vanadium	20 U	20 U	20 U	20 U
Zinc	20 U	20 U	20 U	20 U
MNA/WQ - mg/L				
Alkalinity, Total (AS CaCO3)	93	140	210	110
Biochemical Oxygen Demand (BOD)	2 U	2 U	2 U	2 U
Chloride (as CL)	180	140	94	66
Chemical Oxygen Demand (COD)	20 U	20 U	20 U	20 U
Nitrogen, Ammonia (as N)	0.26	0.05 U	2.1	0.18
Nitrogen, Nitrate (AS N)	2.1	3.2	2.44	2.26
Nitrogen, Nitrite	0.2 U	0.28	0.2 U	0.2
Phosphorus, Total (as P)	0.05 U	0.05 U	0.05	0.05 U
Sulfate (as SO4)	40	32	21	23
Sulfide	0.01 U	0.01 U	0.12	0.01 U
Total Organic Carbon	1 U	1 U	1 U	1 U

Table 2
Analytical Results for Groundwater - 2007

Location ID	MW-03D	MW-03S	MW-04	MW-06
Sample ID	PB-GWMW3D-01	PB-GWMW3S-01	PB-GWMW4-01	PB-GWMW6-01
Sample Date	8/30/2007	8/30/2007	8/30/2007	8/29/2007
Chemical - ug/L				
Total Dissolved Solids	450	450	440	310

Notes:

J - estimated

L - actual value is known to be greater than the value given

mg/L - milligrams per liter

R - Rejected

U - not detected

ug/L - micrograms per liter

Table 2
Analytical Results for Groundwater - 2007

Location ID	MW-07	MW-08	MW-10D	MW-10S	MW-11
Sample ID	PB-GWMW7-01	PB-GWMW08-01	PB-GWMW10D-01	PB-GWMW10S-01	PB-GWMW11-01
Sample Date	9/6/2007	8/28/2007	8/28/2007	8/28/2007	8/29/2007
Chemical - ug/L					
1,1,1-Trichloroethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,4-Dichlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Benzene	0.22 J	0.5 U	0.5 U	0.5 U	0.5 U
Carbon Disulfide	0.5 U	0.5 U	0.5 U	0.13 J	0.5 U
Chlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloroform	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloromethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Cis-1,2-Dichloroethylene	12	18	0.5 U	1.8	5.5
Cyclohexane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dimethyl Benzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Ethylbenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Isopropylbenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methylcyclohexane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methylene Chloride	1.2	0.5 U	0.5 U	0.5 U	1.7
o-Xylene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methyl tert-butyl ether (MTBE)	0.5 U	14	0.5 U	10	1.6
Tetrachloroethylene (PCE)	1,300	430	0.5 U	27	0.5 U
Toluene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trans-1,2-Dichloroethene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trichloroethylene (TCE)	31 J	61	0.5 U	4.2	0.5 U
Vinyl Chloride	0.5 U	0.5 U	0.5 U	0.5 U	0.99
2-Methylnaphthalene	5 U	5 U	1 J	5 U	5 U
Acenaphthene	5 U	5 U	5 U	5 U	1.3 J
Bis(2-ethylhexyl)phthalate	5 U	5 U	5 U	5 U	1.2 J
Carbazole	5 U	5 U	5 U	5 U	5 U
Dibenzofuran	5 U	5 U	5 U	5 U	5 U
Diethyl Phthalate	5 U	5 U	5 U	5 U	5 U

Table 2
Analytical Results for Groundwater - 2007

Location ID	MW-07	MW-08	MW-10D	MW-10S	MW-11
Sample ID	PB-GWMW7-01	PB-GWMW08-01	PB-GWMW10D-01	PB-GWMW10S-01	PB-GWMW11-01
Sample Date	9/6/2007	8/28/2007	8/28/2007	8/28/2007	8/29/2007
Chemical - ug/L					
Fluoranthene	5 U	5 U	5 U	5 U	5 U
Fluorene	5 U	5 U	5 U	5 U	5 U
Naphthalene	5 U	5 U	5 U	5 U	5 U
Phenanthrene	5 U	5 U	5 U	5 U	5 U
Dieldrin	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Aluminum	200 U	200 U	200 U	200 U	5,600
Arsenic	8 U	8 U	8 U	8 U	8 U
Calcium	44,000	52,000	22,000	27,000	42,000
Chromium	5 U	5 U	5 U	5 U	28
Copper	10 U	10 U	10 U	10 U	13
Iron	1,200	810	36,000	800	18,000
Magnesium	9,600	11,000	6,300	4,700	8,900
Manganese	130	350	760	1,100	230
Nickel	20 U	20 U	20 U	20 U	20
Potassium	5,400	9,700	2,100	5,200	5,500
Sodium	190,000	140,000	13,000	81,000	56,000
Vanadium	20 U	20 U	20 U	20 U	23
Zinc	20 U	20 U	20 U	27	56
MNA/WQ - mg/L					
Alkalinity, Total (AS CaCO3)	100	100	64	68	96
Biochemical Oxygen Demand (BOD)	2 U	2 U	2.6 J	2 U	2 U
Chloride (as CL)	340	280	41	140	110
Chemical Oxygen Demand (COD)	20 U	20 U	20 U	20 U	20 U
Nitrogen, Ammonia (as N)	0.05 U	0.05 U	0.16	2.8	0.21
Nitrogen, Nitrate (AS N)	1.56	0.66	0.2 U	0.26	0.2 U
Nitrogen, Nitrite	0.5 R	0.2 U	0.2 U	0.2 U	0.2 U
Phosphorus, Total (as P)	0.05 U	0.05 U	0.079	0.05 U	0.17
Sulfate (as SO4)	44	37	35	39	18
Sulfide	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Total Organic Carbon	27 J	1 U	1 U	1 U	1 U

Table 2
Analytical Results for Groundwater - 2007

Location ID	MW-07	MW-08	MW-10D	MW-10S	MW-11
Sample ID	PB-GWMW7-01	PB-GWMW08-01	PB-GWMW10D-01	PB-GWMW10S-01	PB-GWMW11-01
Sample Date	9/6/2007	8/28/2007	8/28/2007	8/28/2007	8/29/2007
Chemical - ug/L					
Total Dissolved Solids	630	620 J	250 J	400 J	350

Notes:

J - estimated

L - actual value is known to be greater than

mg/L - milligrams per liter

R - Rejected

U - not detected

ug/L - micrograms per liter

Table 2
Analytical Results for Groundwater - 2007

Location ID	MW-12
Sample ID	PB-GWMW12-01
Sample Date	8/29/2007
Chemical - ug/L	
1,1,1-Trichloroethane	0.5 U
1,1-Dichloroethane	0.5 U
1,1-Dichloroethene	0.5 U
1,2-Dichlorobenzene	0.5 U
1,4-Dichlorobenzene	0.5 U
Benzene	0.5 U
Carbon Disulfide	0.5 U
Chlorobenzene	0.5 U
Chloroform	0.5 U
Chloromethane	0.5 U
Cis-1,2-Dichloroethylene	0.5 U
Cyclohexane	0.5 U
Dimethyl Benzene	0.5 U
Ethylbenzene	0.5 U
Isopropylbenzene	0.5 U
Methylcyclohexane	0.5 U
Methylene Chloride	1.5
o-Xylene	0.5 U
Methyl tert-butyl ether (MTBE)	1.7
Tetrachloroethylene (PCE)	0.5 U
Toluene	0.5 U
Trans-1,2-Dichloroethene	0.5 U
Trichloroethylene (TCE)	0.5 U
Vinyl Chloride	0.5 U
2-Methylnaphthalene	5 U
Acenaphthene	5.3
Bis(2-ethylhexyl)phthalate	5 U
Carbazole	5 U
Dibenzofuran	5 U
Diethyl Phthalate	5 U

Table 2
Analytical Results for Groundwater - 2007

Location ID	MW-12
Sample ID	PB-GWMW12-01
Sample Date	8/29/2007
Chemical - ug/L	
Fluoranthene	5 U
Fluorene	5 U
Naphthalene	5 U
Phenanthrene	5 U
Dieldrin	0.1 U
Aluminum	520
Arsenic	8 U
Calcium	67,000
Chromium	5 U
Copper	10 U
Iron	9,000
Magnesium	10,000
Manganese	800
Nickel	20 U
Potassium	6,700
Sodium	75,000
Vanadium	20 U
Zinc	20 U
MNA/WQ - mg/L	
Alkalinity, Total (AS CaCO3)	150 L
Biochemical Oxygen Demand (BOD)	2 U
Chloride (as CL)	170
Chemical Oxygen Demand (COD)	20 U
Nitrogen, Ammonia (as N)	0.37
Nitrogen, Nitrate (AS N)	0.2 U
Nitrogen, Nitrite	0.2 U
Phosphorus, Total (as P)	0.12
Sulfate (as SO4)	9.5
Sulfide	0.01 U
Total Organic Carbon	1 U

Table 2
Analytical Results for Groundwater - 2007

Location ID	MW-12
Sample ID	PB-GWMW12-01
Sample Date	8/29/2007
Chemical - ug/L	
Total Dissolved Solids	540

Notes:

J - estimated

L - actual value is known to be greater than

mg/L - milligrams per liter

R - Rejected

U - not detected

ug/L - micrograms per liter

Table 2
Analytical Results for Groundwater - 2007

Location ID	MW-13D	MW-13S	MW-14	MW-15D	MW-15S
Sample ID	PB-GWMW13D-01	PB-GWMW13S-01	PB-GWMW14-01	PB-GWMW15D-01	PB-GWMW15S-01
Sample Date	8/30/2007	8/30/2007	9/5/2007	9/4/2007	9/4/2007
Chemical - ug/L					
1,1,1-Trichloroethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethane	0.5 U	0.5 U	0.54	0.17 J	0.5 U
1,1-Dichloroethene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,4-Dichlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Benzene	1.8	0.5 U	0.5 U	10	0.5 U
Carbon Disulfide	0.5 U	0.19 J	0.5 U	0.5 U	0.5 U
Chlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloroform	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloromethane	0.5 U	0.17 J	0.5 U	0.5 U	0.5 U
Cis-1,2-Dichloroethylene	0.5 U	0.5 U	0.5 U	0.88	0.5 U
Cyclohexane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dimethyl Benzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Ethylbenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Isopropylbenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methylcyclohexane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methylene Chloride	0.57	0.5 U	0.78	1.7	1.3
o-Xylene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methyl tert-butyl ether (MTBE)	0.5 U	0.56	180	0.4 J	0.5 U
Tetrachloroethylene (PCE)	0.5 U	2.5	0.5 U	20	5.4
Toluene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trans-1,2-Dichloroethene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trichloroethylene (TCE)	0.5 U	1	0.5 U	16	0.75
Vinyl Chloride	1.3	0.5 U	0.5 U	3.3	0.5 U
2-Methylnaphthalene	5 U	5 U	5 U	5 U	5 U
Acenaphthene	5 U	5 U	5 U	5 U	5 U
Bis(2-ethylhexyl)phthalate	5 U	5 U	5 U	5.1	5 U
Carbazole	5 U	5 U	5 U	5 U	5 U
Dibenzofuran	5 U	5 U	5 U	5 U	5 U
Diethyl Phthalate	5 U	5 U	5 U	5 U	5 U

Table 2
Analytical Results for Groundwater - 2007

Location ID	MW-13D	MW-13S	MW-14	MW-15D	MW-15S
Sample ID	PB-GWMW13D-01	PB-GWMW13S-01	PB-GWMW14-01	PB-GWMW15D-01	PB-GWMW15S-01
Sample Date	8/30/2007	8/30/2007	9/5/2007	9/4/2007	9/4/2007
Chemical - ug/L					
Fluoranthene	5 U	5 U	5 U	5 U	5 U
Fluorene	5 U	5 U	5 U	5 U	5 U
Naphthalene	5 U	5 U	5 U	5 U	5 U
Phenanthrene	5 U	5 U	5 U	5 U	5 U
Dieldrin	0.1 U	0.1 U	0.1 U	0.1 U	0.032 J
Aluminum	200 U	240 J	6,700	1,500	760
Arsenic	8 U	8 U	12	8 U	8 U
Calcium	30,000	41,000	13,000	49,000	31,000
Chromium	5 U	25	51	5 U	5 U
Copper	10 U	10 U	10 U	10 U	10 U
Iron	42,000	2,200	18,000	16,000	2,600
Magnesium	8,800	5,600	11,000	10,000	6,500
Manganese	1,000	530	280	900	90
Nickel	20 U	20 U	42	20 U	20 U
Potassium	2,600	4,300	5,600	20,000	4,300
Sodium	24,000	64,000	33,000	29,000	95,000
Vanadium	20 U	20 U	20 U	20 U	20 U
Zinc	20 U	20 U	32	20 U	20 U
MNA/WQ - mg/L					
Alkalinity, Total (AS CaCO3)	73	91	17	120	61
Biochemical Oxygen Demand (BOD)	2.8 J	2 U	2 U	2 U	2 U
Chloride (as CL)	52	110	73	53	170
Chemical Oxygen Demand (COD)	20 U	20 U	20 U	20 U	20 U
Nitrogen, Ammonia (as N)	0.65	1.5	1.9	0.8	0.05 U
Nitrogen, Nitrate (AS N)	0.04 J	0.7	0.04 J	0.2 U	3.72
Nitrogen, Nitrite	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Phosphorus, Total (as P)	0.08	0.05 U	0.11	0.091	0.05 U
Sulfate (as SO4)	42	33	54	35	32
Sulfide	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Total Organic Carbon	1 U	1 U	4.2 J	1 U	1 U

Table 2
Analytical Results for Groundwater - 2007

Location ID	MW-13D	MW-13S	MW-14	MW-15D	MW-15S
Sample ID	PB-GWMW13D-01	PB-GWMW13S-01	PB-GWMW14-01	PB-GWMW15D-01	PB-GWMW15S-01
Sample Date	8/30/2007	8/30/2007	9/5/2007	9/4/2007	9/4/2007
Chemical - ug/L					
Total Dissolved Solids	260	340	160	240	340

Notes:

J - estimated

L - actual value is known to be greater than

mg/L - milligrams per liter

R - Rejected

U - not detected

ug/L - micrograms per liter

Table 2
Analytical Results for Groundwater - 2007

Location ID	MW-16
Sample ID	PB-GWMW16-01
Sample Date	9/5/2007
Chemical - ug/L	
1,1,1-Trichloroethane	0.5 U
1,1-Dichloroethane	0.5 U
1,1-Dichloroethene	0.5 U
1,2-Dichlorobenzene	0.5 U
1,4-Dichlorobenzene	0.5 U
Benzene	0.5 U
Carbon Disulfide	0.5 U
Chlorobenzene	0.5 U
Chloroform	0.5 U
Chloromethane	0.5 U
Cis-1,2-Dichloroethylene	0.5 U
Cyclohexane	0.5 U
Dimethyl Benzene	0.5 U
Ethylbenzene	0.5 U
Isopropylbenzene	0.5 U
Methylcyclohexane	0.5 U
Methylene Chloride	1.1
o-Xylene	0.5 U
Methyl tert-butyl ether (MTBE)	0.5 U
Tetrachloroethylene (PCE)	0.68
Toluene	0.5 U
Trans-1,2-Dichloroethene	0.5 U
Trichloroethylene (TCE)	0.5 U
Vinyl Chloride	0.5 U
2-Methylnaphthalene	5 U
Acenaphthene	5 U
Bis(2-ethylhexyl)phthalate	5 U
Carbazole	5 U
Dibenzofuran	5 U
Diethyl Phthalate	5 U

Table 2
Analytical Results for Groundwater - 2007

Location ID	MW-16
Sample ID	PB-GWMW16-01
Sample Date	9/5/2007
Chemical - ug/L	
Fluoranthene	5 U
Fluorene	5 U
Naphthalene	5 U
Phenanthrene	5 U
Dieldrin	0.1 U
Aluminum	250 J
Arsenic	8 U
Calcium	30,000
Chromium	5 U
Copper	10 U
Iron	250
Magnesium	6,700
Manganese	37
Nickel	20 U
Potassium	3,000
Sodium	74,000
Vanadium	20 U
Zinc	20 U
MNA/WQ - mg/L	
Alkalinity, Total (AS CaCO3)	53
Biochemical Oxygen Demand (BOD)	2 U
Chloride (as CL)	140
Chemical Oxygen Demand (COD)	20 U
Nitrogen, Ammonia (as N)	0.29
Nitrogen, Nitrate (AS N)	0.88
Nitrogen, Nitrite	0.2 U
Phosphorus, Total (as P)	0.05 U
Sulfate (as SO4)	36
Sulfide	0.01 U
Total Organic Carbon	13 J

Table 2
Analytical Results for Groundwater - 2007

Location ID	MW-16
Sample ID	PB-GWMW16-01
Sample Date	9/5/2007
Chemical - ug/L	
Total Dissolved Solids	280

Notes:

J - estimated

L - actual value is known to be greater than

mg/L - milligrams per liter

R - Rejected

U - not detected

ug/L - micrograms per liter

Table 2
Analytical Results for Groundwater - 2007

Location ID	MW-17	MW-18D	MW-18S	MW-19	MW-20
Sample ID	PB-GWMW17-01	PB-GWMW18D-01	PB-GWMW18S-01	PB-GWMW19-01	PB-GWMW20-01
Sample Date	9/10/2007	9/7/2007	9/7/2007	9/6/2007	9/4/2007
Chemical - ug/L					
1,1,1-Trichloroethane	0.22 J	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,4-Dichlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Benzene	0.5 U	0.5 U	0.5 U	0.5 U	0.12 J
Carbon Disulfide	1.5	3.9 J	0.5 U	1.5	0.5 U
Chlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloroform	0.5 U	1.9	0.5 U	0.5 U	0.5 U
Chloromethane	0.5 U	0.31 J	0.33 J	0.5 U	0.5 U
Cis-1,2-Dichloroethylene	0.14 J	0.5 U	0.36 J	0.88	0.5 U
Cyclohexane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dimethyl Benzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Ethylbenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Isopropylbenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methylcyclohexane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methylene Chloride	0.5 U	0.5 U	0.5 U	1.4	2.1
o-Xylene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methyl tert-butyl ether (MTBE)	0.5 U	8.2	0.5 U	0.5 U	0.5 U
Tetrachloroethylene (PCE)	0.41 J	2.3	5.9	0.5 U	0.5 U
Toluene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trans-1,2-Dichloroethene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trichloroethylene (TCE)	0.23 J	0.5 U	0.56	0.5 U	0.5 U
Vinyl Chloride	0.5 U	0.37 J	0.5 U	0.5 U	0.5 U
2-Methylnaphthalene	5 U	7.7	5 U	5 U	5 U
Acenaphthene	5 U	5 U	5 U	5 U	5 U
Bis(2-ethylhexyl)phthalate	5 U	5 U	5 U	5 U	5 U
Carbazole	5 U	5 U	5 U	5 U	5 U
Dibenzofuran	5 U	5 U	5 U	5 U	5 U
Diethyl Phthalate	5 U	5 U	1 J	5 U	5 U

Table 2
Analytical Results for Groundwater - 2007

Location ID	MW-17	MW-18D	MW-18S	MW-19	MW-20
Sample ID	PB-GWMW17-01	PB-GWMW18D-01	PB-GWMW18S-01	PB-GWMW19-01	PB-GWMW20-01
Sample Date	9/10/2007	9/7/2007	9/7/2007	9/6/2007	9/4/2007
Chemical - ug/L					
Fluoranthene	5 U	5 U	5 U	5 U	5 U
Fluorene	5 U	5 U	5 U	5 U	5 U
Naphthalene	5 U	1.3 J	5 U	5 U	5 U
Phenanthrene	5 U	5 U	5 U	5 U	5 U
Dieldrin	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Aluminum	4,200	5,100	360 J	1,200	200 U
Arsenic	8 U	8 U	8 U	8 U	8 U
Calcium	60,000	27,000	39,000	81,000	42,000
Chromium	77	12	5 U	6	27
Copper	10 U	10 U	10 U	10 U	10 U
Iron	9,700	17,000	740	4,500	460
Magnesium	12,000	5,100	8,000	20,000	6,900
Manganese	510	450	5 U	220	280
Nickel	49	20 U	20 U	20 U	21
Potassium	4,500	3,300	4,600	6,200	15,000
Sodium	110,000	200,000	110,000	340,000	160,000
Vanadium	20 U	20 U	20 U	20 U	20 U
Zinc	45	20 U	20 U	20 U	20 U
MNA/WQ - mg/L					
Alkalinity, Total (AS CaCO3)	90	230	74	220	89
Biochemical Oxygen Demand (BOD)	2 J	2 U	2 R	2 U	2 U
Chloride (as CL)	230	93	190	640	310
Chemical Oxygen Demand (COD)	20 U	110	20 U	20 U	20 U
Nitrogen, Ammonia (as N)	0.05 U	0.16	0.13	0.5	0.12
Nitrogen, Nitrate (AS N)	0.18 J	4.06	0.04 J	0.2 U	0.68
Nitrogen, Nitrite	0.2 U	0.2 U	0.2 U	1 R	0.5 R
Phosphorus, Total (as P)	0.17	0.19	0.05 U	0.065	0.05 U
Sulfate (as SO4)	37	200	32	9.8	17
Sulfide	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Total Organic Carbon	21 J	73 J	19 J	50 J	1 U

Table 2
Analytical Results for Groundwater - 2007

Location ID	MW-17	MW-18D	MW-18S	MW-19	MW-20
Sample ID	PB-GWMW17-01	PB-GWMW18D-01	PB-GWMW18S-01	PB-GWMW19-01	PB-GWMW20-01
Sample Date	9/10/2007	9/7/2007	9/7/2007	9/6/2007	9/4/2007
Chemical - ug/L					
Total Dissolved Solids	NA	680	390	1100	540

Notes:

J - estimated

L - actual value is known to be greater than

mg/L - milligrams per liter

R - Rejected

U - not detected

ug/L - micrograms per liter

Table 2
Analytical Results for Groundwater - 2007

Location ID	MW-21D
Sample ID	PB-GWMW21D-01
Sample Date	9/5/2007
Chemical - ug/L	
1,1,1-Trichloroethane	0.5 U
1,1-Dichloroethane	0.5 U
1,1-Dichloroethene	3.3
1,2-Dichlorobenzene	0.5 U
1,4-Dichlorobenzene	0.5 U
Benzene	6.1
Carbon Disulfide	0.5 U
Chlorobenzene	0.5 U
Chloroform	0.5 U
Chloromethane	1.2
Cis-1,2-Dichloroethylene	1.6
Cyclohexane	0.5 U
Dimethyl Benzene	0.5 U
Ethylbenzene	0.5 U
Isopropylbenzene	0.5 U
Methylcyclohexane	0.5 U
Methylene Chloride	1.7
o-Xylene	0.5 U
Methyl tert-butyl ether (MTBE)	0.5 U
Tetrachloroethylene (PCE)	2,600
Toluene	0.5 U
Trans-1,2-Dichloroethene	0.56
Trichloroethylene (TCE)	240
Vinyl Chloride	1.6
2-Methylnaphthalene	5 U
Acenaphthene	5 U
Bis(2-ethylhexyl)phthalate	5 U
Carbazole	5 U
Dibenzofuran	5 U
Diethyl Phthalate	5 U

Table 2
Analytical Results for Groundwater - 2007

Location ID	MW-21D
Sample ID	PB-GWMW21D-01
Sample Date	9/5/2007
Chemical - ug/L	
Fluoranthene	5 U
Fluorene	5 U
Naphthalene	5 U
Phenanthrene	5 U
Dieldrin	0.1 U
Aluminum	1,800
Arsenic	8 U
Calcium	34,000
Chromium	7.8
Copper	10 U
Iron	38,000
Magnesium	9,800
Manganese	1,100
Nickel	20 U
Potassium	3,400
Sodium	13,000
Vanadium	20 U
Zinc	20 U
MNA/WQ - mg/L	
Alkalinity, Total (AS CaCO3)	76
Biochemical Oxygen Demand (BOD)	2.5
Chloride (as CL)	59
Chemical Oxygen Demand (COD)	20 U
Nitrogen, Ammonia (as N)	0.33
Nitrogen, Nitrate (AS N)	
Nitrogen, Nitrite	0.2 U
Phosphorus, Total (as P)	0.05 U
Sulfate (as SO4)	27
Sulfide	0.01 U
Total Organic Carbon	13 J

Table 2
Analytical Results for Groundwater - 2007

Location ID	MW-21D
Sample ID	PB-GWMW21D-01
Sample Date	9/5/2007
Chemical - ug/L	
Total Dissolved Solids	210

Notes:

J - estimated

L - actual value is known to be greater than

mg/L - milligrams per liter

R - Rejected

U - not detected

ug/L - micrograms per liter

Table 2
Analytical Results for Groundwater - 2007

Location ID	MW-21S	MW-22D	MW-22S	MW-23	N1114
Sample ID	PB-GWMW21S-01	PB-GWMW22D-01	PB-GWMW22S-01	PB-GWMW23-01	PB-GWN1114-01
Sample Date	9/5/2007	8/31/2007	8/31/2007	9/6/2007	9/10/2007
Chemical - ug/L					
1,1,1-Trichloroethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichlorobenzene	0.5 U	0.5 U	0.5 U	0.32 J	0.5 U
1,4-Dichlorobenzene	0.5 U	0.5 U	0.5 U	0.12 J	0.5 U
Benzene	0.5 U	9.6	0.5 U	0.5 U	0.5 U
Carbon Disulfide	0.5 U	0.5 U	0.5 U	0.5 U	0.18 J
Chlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloroform	0.71	0.5 U	0.5 U	0.5 U	0.5 U
Chloromethane	0.5 U	0.2 J	0.5 U	0.5 U	0.5 U
Cis-1,2-Dichloroethylene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Cyclohexane	0.5 U	0.5 U	0.5 U	0.5 U	0.7
Dimethyl Benzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Ethylbenzene	0.5 U	0.5 U	0.5 U	0.5 U	1.4
Isopropylbenzene	0.5 U	0.5 U	0.5 U	2	0.65
Methylcyclohexane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methylene Chloride	0.5 U	0.5 U	0.5 U	1.4	0.5 U
o-Xylene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methyl tert-butyl ether (MTBE)	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Tetrachloroethylene (PCE)	140	0.5 U	0.5 U	0.5 U	0.14 J
Toluene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trans-1,2-Dichloroethene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trichloroethylene (TCE)	0.28 J	0.5 U	0.5 U	0.5 U	0.1 J
Vinyl Chloride	0.5 U	2.1	0.5 U	0.5 U	0.5 U
2-Methylnaphthalene	5 U	5 U	5 U	5 U	5 U
Acenaphthene	5 U	5 U	5 U	5 U	5 U
Bis(2-ethylhexyl)phthalate	5 U	5 U	5 U	5.1	1.6 J
Carbazole	5 U	5 U	5 U	5 U	5 U
Dibenzofuran	5 U	5 U	5 U	5 U	5 U
Diethyl Phthalate	5 U	5 U	5 U	5 U	5 U

Table 2
Analytical Results for Groundwater - 2007

Location ID	MW-21S	MW-22D	MW-22S	MW-23	N1114
Sample ID	PB-GWMW21S-01	PB-GWMW22D-01	PB-GWMW22S-01	PB-GWMW23-01	PB-GWN1114-01
Sample Date	9/5/2007	8/31/2007	8/31/2007	9/6/2007	9/10/2007
Chemical - ug/L					
Fluoranthene	5 U	5 U	5 U	5 U	5 U
Fluorene	5 U	5 U	5 U	5 U	5 U
Naphthalene	5 U	5 U	5 U	5 U	5 U
Phenanthrene	5 U	5 U	5 U	5 U	5 U
Dieldrin	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Aluminum	3,000	1,400	870	200 U	100 U
Arsenic	8 U	8 U	8 U	8 U	8 U
Calcium	30,000	41,000	46,000	32,000	44,000
Chromium	170	5 U	11	10	5 U
Copper	10 U	64	10 U	10 U	10 U
Iron	7,200	34,000	1,700	1,000	21,000
Magnesium	6,700	11,000	5,300	5,500	4,900
Manganese	88	810	48	80	140
Nickel	110	20 U	20 U	20 U	20 U
Potassium	4,000	3,300	2,800	2,800	6,200
Sodium	110,000	18,000	170,000	67,000	93,000
Vanadium	20 U	20 U	20 U	20 U	20 U
Zinc	47	42	20 U	20 U	940
MNA/WQ - mg/L					
Alkalinity, Total (AS CaCO3)	40	48 J	83 J	51	70
Biochemical Oxygen Demand (BOD)	2 U			2 U	2 U
Chloride (as CL)	230	98 J	320 J	140	190
Chemical Oxygen Demand (COD)	20 U	20 U	20 U	20 U	20 U
Nitrogen, Ammonia (as N)	0.05 U	1.3 J	0.27 J	0.05 U	1.7
Nitrogen, Nitrate (AS N)	3.08			1.82	
Nitrogen, Nitrite	0.2 U			0.2 U	0.2 U
Phosphorus, Total (as P)	0.05 U	0.05 U	0.062 J	0.05 U	0.05 U
Sulfate (as SO4)	26	24 J	29 J	21	21
Sulfide	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Total Organic Carbon	9.8 J	11	20	13 J	20 J

Table 2
Analytical Results for Groundwater - 2007

Location ID	MW-21S	MW-22D	MW-22S	MW-23	N1114
Sample ID	PB-GWMW21S-01	PB-GWMW22D-01	PB-GWMW22S-01	PB-GWMW23-01	PB-GWN1114-01
Sample Date	9/5/2007	8/31/2007	8/31/2007	9/6/2007	9/10/2007
Chemical - ug/L					
Total Dissolved Solids	200	360	640	270	

Notes:

J - estimated

L - actual value is known to be greater than

mg/L - milligrams per liter

R - Rejected

U - not detected

ug/L - micrograms per liter

Table 3
Analytical Results for Groundwater - May 2010

Location ID Sample ID Sample Date	MW-10D PEN-GW10D-01 5/11/2010	MW-10S PEN-GW10S-01 5/11/2010	MW-11 PEN-GW11-01 5/17/2010	MW-12 PEN-GW12-01 5/19/2010	MW-13D PEN-GW13D-01 5/12/2010	MW-13S PEN-GW13S-01 5/12/2010
Chemical - ug/L						
Benzene	5 U	5 U	5 U	5 U	7	5 U
Cis-1,2-Dichloroethylene	5 U	5 U	5 U	5 U	5 U	5 U
Methyl tert-butyl ether (MTBE)	5 U	11	5 U	5 U	5 U	5 U
Tetrachloroethylene (PCE)	5 U	7.8	5 U	5 U	5 U	5 U
Trichloroethylene (TCE)	5 U	5 U	5 U	5 U	5 U	5 U
Vinyl Chloride	5 U	5 U	59	5 U	5 U	5 U

Notes:

U - not detected

ug/L - micrograms per liter

Table 3
Analytical Results for Groundwater - May 2010

Location ID Sample ID Sample Date	MW-14 PEN-GW14-01 5/17/2010	MW-15D PEN-GW15D-01 5/13/2010	MW-15S PEN-GW15S-01 5/13/2010	MW-16 PEN-GW16-01 5/17/2010	MW-17 PEN-GW17-01 5/14/2010	MW-18D PEN-GW18D-01 5/13/2010
Chemical - ug/L						
Benzene	5 U	18	5 U	5 U	5 U	5 U
Cis-1,2-Dichloroethylene	5 U	7.3	5 U	5 U	5 U	5 U
Methyl tert-butyl ether (MTBE)	26	5 U	5 U	5 U	5 U	8.8
Tetrachloroethylene (PCE)	5 U	53	8.7	18	5 U	5 U
Trichloroethylene (TCE)	5 U	70	5 U	5 U	5 U	5 U
Vinyl Chloride	5 U	5 U	5 U	5 U	5 U	5 U

Notes:

U - not detected

ug/L - micrograms per liter

Table 3
Analytical Results for Groundwater - May 2010

Location ID Sample ID Sample Date	MW-18S PEN-GW18S-01 5/13/2010	MW-19 PEN-GW19-01 5/14/2010	MW-20 PEN-GW20-01 5/19/2010	MW-21D PEN-GW21D-01 5/17/2010	MW-21S PEN-GW21S-01 5/17/2010	MW-22D PEN-GW22D-01 5/18/2010
Chemical - ug/L						
Benzene	5 U	5 U	5 U	5 U	5 U	5 U
Cis-1,2-Dichloroethylene	12	5 U	5 U	5 U	5 U	5 U
Methyl tert-butyl ether (MTBE)	5 U	5 U	5 U	5 U	5 U	5 U
Tetrachloroethylene (PCE)	2,300	5 U	5 U	4,000	5 U	5 U
Trichloroethylene (TCE)	16	5 U	5 U	270	5 U	5 U
Vinyl Chloride	5 U	5 U	5 U	5 U	5 U	5 U

Notes:

U - not detected

ug/L - micrograms per liter

Table 3
Analytical Results for Groundwater - May 2010

Location ID Sample ID Sample Date	MW-22S PEN-GW22S-01 5/18/2010	MW-24 PEN-GW24-01 5/18/2010	MW-25D PEN-GW25D-01 5/13/2010	MW-25S PEN-GW25S-01 5/13/2010	MW-26D PEN-GW26D-01 5/14/2010	MW-26S PEN-GW26S-01 5/14/2010
Chemical - ug/L						
Benzene	5 U	5 U	5 U	5 U	5 U	5 U
Cis-1,2-Dichloroethylene	5 U	5 U	5 U	5 U	5 U	5 U
Methyl tert-butyl ether (MTBE)	5 U	5 U	5 U	5 U	5 U	5 U
Tetrachloroethylene (PCE)	5 U	5 U	5 U	5 U	5 U	20
Trichloroethylene (TCE)	5 U	5 U	5 U	5 U	5 U	5.3
Vinyl Chloride	5 U	5 U	5 U	5 U	5 U	5 U

Notes:

U - not detected

ug/L - micrograms per liter

Table 3
Analytical Results for Groundwater - May 2010

Location ID Sample ID Sample Date	MW-27D PEN-GW27D-01 5/12/2010	MW-27S PEN-GW27S-01 5/12/2010	MW-28D PEN-GW28D-01 5/11/2010	MW-28S PEN-GW28S-01 5/11/2010	MW-29 PEN-GW29-01 5/19/2010	PZ-1 PEN-GWPZ01-01 5/17/2010
Chemical - ug/L						
Benzene	500 U	5.3	5 U	5 U	5 U	5 U
Cis-1,2-Dichloroethylene	520	5 U	5 U	5 U	5 U	5 U
Methyl tert-butyl ether (MTBE)	500 U	5 U	5 U	5 U	5 U	5 U
Tetrachloroethylene (PCE)	30,000	5 U	5 U	5 U	5 U	5 U
Trichloroethylene (TCE)	10,000	11	5 U	5 U	5 U	5 U
Vinyl Chloride	500 U	5 U	5 U	5 U	5 U	5 U

Notes:

U - not detected

ug/L - micrograms per liter

Table 4
Analytical Results for Groundwater - August 2010

Location ID	MW-24	MW-25D	MW-25S	MW-26D	MW-26S	MW-27D
Sample ID	PEN-GW24-02	PEN-GW25D-02	PEN-GW25S-02	PEN-GW26D-02	PEN-GW26S-02	PEN-GW27D-02
Sample Date	8/16/2010	8/17/2010	8/17/2010	8/18/2010	8/18/2010	8/18/2010
Chemical - ug/L						
Benzene	5 U	5 U	5 U	5 UJ	5 UJ	500 UJ
Cis-1,2-Dichloroethylene	5 U	5 U	5 U	5 UJ	5 UJ	9,400 J
Tetrachloroethylene (PCE)	5 U	5 U	5 U	5 UJ	26 J	23,000 J
Trichloroethylene (TCE)	5 U	5 U	5 U	5 UJ	5 UJ	5,800 J

Notes:

J - estimated value

U - not detected

ug/L - micrograms per liter

Table 4
Analytical Results for Groundwater - August 2010

Location ID	MW-27S	MW-28D	MW-28S	MW-29
Sample ID	PEN-GW27S-02	PEN-GW28D-02	PEN-GW28S-02	PEN-GW29-02
Sample Date	8/18/2010	8/17/2010	8/17/2010	8/16/2010
Chemical - ug/L				
Benzene	6.8 J	5 U	5 U	5 U
Cis-1,2-Dichloroethylene	5 UJ	5 U	5 U	5 U
Tetrachloroethylene (PCE)	5 UJ	5 U	5 U	5 U
Trichloroethylene (TCE)	5 UJ	5 U	5 U	5 U

Notes:

J - estimated value

U - not detected

ug/L - micrograms per liter

Table 5
Analytical Results of EPA Sampling of Groundwater at LIAWC Well Field #5, October 2010

	Location ID	WF5-5R	WF5-7R	WF5-21R	WF5-52R	WF5-55R
	Sample ID	AM04366	AM04368	AM04363	AM04364	AM04365
	Sample Date	10/5/2010	10/4/2010	10/4/2010	10/5/2010	10/5/2010
	Result Units	ug/l	ug/l	ug/l	ug/l	ug/l
CHEMICAL NAME	CAS					
CHLOROMETHANE	74-87-3	ND	1	0.85	0.9	0.94
CHLOROFORM	67-66-3	ND	ND	ND	ND	0.57
TETRACHLOROETHENE (PCE)	127-18-4	ND	ND	ND	ND	4.1
METHYL TERT-BUTYL ETHER	1634-04-4	1.6	ND	ND	ND	ND
TOLUENE	108-88-3	ND	0.89	ND	ND	ND

All samples were collected by EPA and analyzed for TCL VOCs.

ND - Not detected

ug/l - micrograms per liter

Table 6
Analytical Results for Groundwater - April - May 2011

Location ID Sample ID Sample Date	MW-03D AN01823 4/26/2011	MW-03S AN01824 4/26/2011	MW-04 AN01825 4/27/2011	MW-06 AN01826 4/26/2011	MW-07 AN01827 4/26/2011	MW-10D AN01828 4/27/2011
Chemical - ug/L						
1,1,1-TRICHLOROETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2,2-TETRACHLOROETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-TRICHLOROETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-DICHLOROETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-DICHLOROETHENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,3-TRICHLOROBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,4-TRICHLOROBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-DIBROMO-3-CHLOROPROPANE	2 U	2 U	0.5 U	2 U	2 U	0.5 U
1,2-DIBROMOETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-DICHLOROBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-DICHLOROETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-DICHLOROPROPANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,3-DICHLOROBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,4-DICHLOROBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
2-HEXANONE	5 U	5 U	5 U	5 U	5 U	5 U
ACETONE	190	5 U	24	15	13	5 U
BENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
BROMOCHLOROMETHANE	1 U	1 U	0.5 U	1 U	1 U	0.5 U
BROMODICHLOROMETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
BROMOFORM	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
BROMOMETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CARBON DISULFIDE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CARBON TETRACHLORIDE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CHLOROBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CHLOROETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CHLOROFORM	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CHLOROMETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CIS-1,2-DICHLOROETHYLENE	12	6.7	0.96	0.5 U	5.7	0.5 U
CIS-1,3-DICHLOROPROPENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CYCLOHEXANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
DIBROMOCHLOROMETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
DICHLORODIFLUOROMETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
ETHYLBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
ISOPROPYLBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

Table 6
Analytical Results for Groundwater - April - May 2011

Location ID Sample ID Sample Date	MW-03D AN01823 4/26/2011	MW-03S AN01824 4/26/2011	MW-04 AN01825 4/27/2011	MW-06 AN01826 4/26/2011	MW-07 AN01827 4/26/2011	MW-10D AN01828 4/27/2011
Chemical - ug/L						
M, P XYLENES	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
METHYL ACETATE	2 U	2 U	0.5 U	2 U	2 U	0.5 U
METHYL ETHYL KETONE	5 U	5 U	5 U	5 U	5 U	5 U
METHYL ISOBUTYL KETONE	5 U	5 U	5 U	5 U	5 U	5 U
METHYLCYCLOHEXANE	0.5 U	1.2	0.5 U	0.5 U	0.5 U	0.5 U
METHYLENE CHLORIDE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
O-XYLENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
STYRENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TERT-BUTYL METHYL ETHER	2 UJ	2 UJ	0.5 U	2 UJ	2 UJ	0.5 U
TETRACHLOROETHYLENE (PCE)	240	290	0.5 U	3.6	430	0.5 U
TOLUENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRANS-1,2-DICHLOROETHENE	0.5 U	0.5 U	0.86	0.5 U	0.5 U	0.5 U
TRANS-1,3-DICHLOROPROPENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRICHLOROETHYLENE (TCE)	20	10	0.5 U	0.5 U	31	0.5 U
TRICHLOROFLUOROMETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
VINYL CHLORIDE	0.5 U	0.5 U	21	0.5 U	0.5 U	0.5 U

Notes:

J - estimated value

U - non-detect

ug/L - micrograms per Liter

Table 6
Analytical Results for Groundwater - April - May 2011

Location ID Sample ID Sample Date	MW-10S AN01829 4/27/2011	MW-11 AN01830 4/27/2011	MW-13D AN01831 4/26/2011	MW-13S AN01832 4/26/2011	MW-14 AN01853 5/2/2011	MW-15D AN01834 4/25/2011
Chemical - ug/L						
1,1,1-TRICHLOROETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2,2-TETRACHLOROETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-TRICHLOROETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-DICHLOROETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.56	0.5 U
1,1-DICHLOROETHENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.2
1,2,3-TRICHLOROBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,4-TRICHLOROBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-DIBROMO-3-CHLOROPROPANE	0.5 U	0.5 U	2 U	2 U	2 U	2 U
1,2-DIBROMOETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-DICHLOROBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-DICHLOROETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-DICHLOROPROPANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,3-DICHLOROBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,4-DICHLOROBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
2-HEXANONE	5 U	5 U	5 U	5 U	5 U	10 U
ACETONE	120	5 U	5 U	5 U	5 U	530
BENZENE	0.5 U	0.5 U	7.8	0.5 U	0.5 U	16
BROMOCHLOROMETHANE	0.5 U	0.5 U	1 U	1 U	1 U	0.5 U
BROMODICHLOROMETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
BROMOFORM	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
BROMOMETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CARBON DISULFIDE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CARBON TETRACHLORIDE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CHLOROBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CHLOROETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CHLOROFORM	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CHLOROMETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CIS-1,2-DICHLOROETHYLENE	1.6	1.5	0.5 U	0.5 U	0.5 U	19
CIS-1,3-DICHLOROPROPENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CYCLOHEXANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
DIBROMOCHLOROMETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
DICHLORODIFLUOROMETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
ETHYLBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
ISOPROPYLBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

Table 6
Analytical Results for Groundwater - April - May 2011

Location ID Sample ID Sample Date	MW-10S AN01829 4/27/2011	MW-11 AN01830 4/27/2011	MW-13D AN01831 4/26/2011	MW-13S AN01832 4/26/2011	MW-14 AN01853 5/2/2011	MW-15D AN01834 4/25/2011
Chemical - ug/L						
M, P XYLENES	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
METHYL ACETATE	0.5 U	0.5 U	2 U	2 U	2 U	1 U
METHYL ETHYL KETONE	5 U	5 U	5 U	5 U	5 U	10 U
METHYL ISOBUTYL KETONE	5 U	5 U	5 U	5 U	5 U	5 U
METHYLCYCLOHEXANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
METHYLENE CHLORIDE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
O-XYLENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
STYRENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TERT-BUTYL METHYL ETHER	7.3	0.5 U	2 UJ	2 UJ	4.5 J	2 U
TETRACHLOROETHYLENE (PCE)	8.7	0.5 U	0.5 U	11	0.5 U	36
TOLUENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRANS-1,2-DICHLOROETHENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRANS-1,3-DICHLOROPROPENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U
TRICHLOROETHYLENE (TCE)	1.1	0.5 U	0.67	0.67	0.5 U	38
TRICHLOROFLUOROMETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
VINYL CHLORIDE	0.5 U	5.7	1.7	0.5 U	0.5 U	1.5

Notes:

J - estimated value

U - non-detect

ug/L - micrograms per Liter

Table 6
Analytical Results for Groundwater - April - May 2011

Location ID Sample ID Sample Date	MW-15S AN01835 4/25/2011	MW-16 AN01836 4/28/2011	MW-17 AN01838 4/27/2011	MW-18D AN01839 4/25/2011	MW-18S AN01840 4/25/2011	MW-19 AN01841 4/27/2011
Chemical - ug/L						
1,1,1-TRICHLOROETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2,2-TETRACHLOROETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-TRICHLOROETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-DICHLOROETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-DICHLOROETHENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,3-TRICHLOROBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,4-TRICHLOROBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-DIBROMO-3-CHLOROPROPANE	2 U	0.5 U	0.5 U	2 U	2 U	0.5 U
1,2-DIBROMOETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-DICHLOROBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-DICHLOROETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-DICHLOROPROPANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,3-DICHLOROBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,4-DICHLOROBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
2-HEXANONE	10 U	5 U	5 U	10 U	5 U	5 U
ACETONE	9	57	5 U	14	130	5 U
BENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
BROMOCHLOROMETHANE	0.5 U	0.5 U	0.5 U	0.5 U	1 U	0.5 U
BROMODICHLOROMETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
BROMOFORM	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
BROMOMETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CARBON DISULFIDE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CARBON TETRACHLORIDE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CHLOROBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CHLOROETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CHLOROFORM	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CHLOROMETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CIS-1,2-DICHLOROETHYLENE	0.5 U	0.5 U	0.5 U	4.3	0.5 U	0.75
CIS-1,3-DICHLOROPROPENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CYCLOHEXANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
DIBROMOCHLOROMETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
DICHLORODIFLUOROMETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
ETHYLBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
ISOPROPYLBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

Table 6
Analytical Results for Groundwater - April - May 2011

Location ID Sample ID Sample Date	MW-15S AN01835 4/25/2011	MW-16 AN01836 4/28/2011	MW-17 AN01838 4/27/2011	MW-18D AN01839 4/25/2011	MW-18S AN01840 4/25/2011	MW-19 AN01841 4/27/2011
Chemical - ug/L						
M, P XYLENES	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
METHYL ACETATE	1 U	0.5 U	0.5 U	1 U	2 U	0.5 U
METHYL ETHYL KETONE	10 U	5 U	5 U	10 U	5 U	5 U
METHYL ISOBUTYL KETONE	5 U	5 U	5 U	5 U	5 U	5 U
METHYLCYCLOHEXANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
METHYLENE CHLORIDE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
O-XYLENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
STYRENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TERT-BUTYL METHYL ETHER	2 U	0.5 U	0.5 U	2 U	2 UJ	0.5 U
TETRACHLOROETHYLENE (PCE)	36	0.5 U	0.5 U	0.5 U	8	0.5 U
TOLUENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRANS-1,2-DICHLOROETHENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRANS-1,3-DICHLOROPROPENE	1 U	0.5 U	0.5 U	1 U	0.5 U	0.5 U
TRICHLOROETHYLENE (TCE)	1.2	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRICHLOROFLUOROMETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
VINYL CHLORIDE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

Notes:

J - estimated value

U - non-detect

ug/L - micrograms per Liter

Table 6
Analytical Results for Groundwater - April - May 2011

Location ID Sample ID Sample Date	MW-20 AN01854 5/2/2011	MW-21D AN01842 4/26/2011	MW-21S AN01843 4/26/2011	MW-22D AN01844 4/27/2011	MW-22S AN01845 4/27/2011	MW-23 AN01846 4/28/2011
Chemical - ug/L						
1,1,1-TRICHLOROETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2,2-TETRACHLOROETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-TRICHLOROETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-DICHLOROETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-DICHLOROETHENE	0.5 U	0.5 U	3.1	0.5 U	0.5 U	0.5 U
1,2,3-TRICHLOROBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,4-TRICHLOROBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-DIBROMO-3-CHLOROPROPANE	2 U	2 U	2 U	0.5 U	2 U	2 U
1,2-DIBROMOETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-DICHLOROBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-DICHLOROETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-DICHLOROPROPANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,3-DICHLOROBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,4-DICHLOROBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
2-HEXANONE	5 U	5 U	5 U	5 U	5 U	5 U
ACETONE	5 U	5 U	5 U	27	5 U	5 U
BENZENE	0.5 U	0.5 U	4.7	2.6	0.5 U	0.5 U
BROMOCHLOROMETHANE	1 U	1 U	1 U	0.5 U	1 U	1 U
BROMODICHLOROMETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
BROMOFORM	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
BROMOMETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CARBON DISULFIDE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CARBON TETRACHLORIDE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CHLOROBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CHLOROETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CHLOROFORM	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CHLOROMETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CIS-1,2-DICHLOROETHYLENE	0.5 U	0.5 U	1.5	0.5 U	0.5 U	0.5 U
CIS-1,3-DICHLOROPROPENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CYCLOHEXANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	12
DIBROMOCHLOROMETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
DICHLORODIFLUOROMETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
ETHYLBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	46
ISOPROPYLBENZENE	0.63	0.5 U	0.5 U	0.5 U	0.5 U	9.5

Table 6
Analytical Results for Groundwater - April - May 2011

Location ID Sample ID Sample Date	MW-20 AN01854 5/2/2011	MW-21D AN01842 4/26/2011	MW-21S AN01843 4/26/2011	MW-22D AN01844 4/27/2011	MW-22S AN01845 4/27/2011	MW-23 AN01846 4/28/2011
Chemical - ug/L						
M, P XYLENES	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	820
METHYL ACETATE	2 U	2 U	2 U	0.5 U	2 U	2 U
METHYL ETHYL KETONE	5 U	5 U	5 U	5 U	5 U	5 U
METHYL ISOBUTYL KETONE	5 U	5 U	5 U	5 U	5 U	5 U
METHYLCYCLOHEXANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	26
METHYLENE CHLORIDE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
O-XYLENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	60
STYRENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TERT-BUTYL METHYL ETHER	2 UJ	2 UJ	2 UJ	0.5 U	2 UJ	2 UJ
TETRACHLOROETHYLENE (PCE)	0.5 U	100	4000	0.5 U	0.5 U	0.5 U
TOLUENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.3
TRANS-1,2-DICHLOROETHENE	0.5 U	0.5 U	0.82	0.5 U	0.5 U	0.5 U
TRANS-1,3-DICHLOROPROPENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRICHLOROETHYLENE (TCE)	0.5 U	0.9	290	0.5 U	0.5 U	0.5 U
TRICHLOROFLUOROMETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
VINYL CHLORIDE	0.5 U	0.5 U	1.5	5	0.5 U	0.5 U

Notes:

J - estimated value

U - non-detect

ug/L - micrograms per Liter

Table 6
Analytical Results for Groundwater - April - May 2011

Location ID Sample ID Sample Date	MW-24 AN01852 4/28/2011	MW-29 AN01855 5/2/2011	PZ-1 AN01847 4/28/2011
Chemical - ug/L			
1,1,1-TRICHLOROETHANE	0.5 U	0.5 U	0.5 U
1,1,2,2-TETRACHLOROETHANE	0.5 U	0.5 U	0.5 U
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	0.5 U	0.5 U	0.5 U
1,1,2-TRICHLOROETHANE	0.5 U	0.5 U	0.5 U
1,1-DICHLOROETHANE	0.5 U	0.5 U	0.5 U
1,1-DICHLOROETHENE	0.5 U	0.5 U	0.5 U
1,2,3-TRICHLOROBENZENE	0.5 U	0.5 U	0.5 U
1,2,4-TRICHLOROBENZENE	0.5 U	0.5 U	0.5 U
1,2-DIBROMO-3-CHLOROPROPANE	2 U	2 U	2 U
1,2-DIBROMOETHANE	0.5 U	0.5 U	0.5 U
1,2-DICHLOROBENZENE	0.5 U	0.5 U	0.5 U
1,2-DICHLOROETHANE	0.5 U	0.5 U	0.5 U
1,2-DICHLOROPROPANE	0.5 U	0.5 U	0.5 U
1,3-DICHLOROBENZENE	0.5 U	0.5 U	0.5 U
1,4-DICHLOROBENZENE	0.5 U	0.5 U	0.5 U
2-HEXANONE	5 U	5 U	5 U
ACETONE	5 U	5 U	83
BENZENE	0.5 U	0.5 U	0.5 U
BROMOCHLOROMETHANE	1 U	1 U	1 U
BROMODICHLOROMETHANE	0.5 U	0.5 U	0.5 U
BROMOFORM	0.5 U	0.5 U	0.5 U
BROMOMETHANE	0.5 U	0.5 U	0.5 U
CARBON DISULFIDE	0.5 U	0.5 U	0.5 U
CARBON TETRACHLORIDE	0.5 U	0.5 U	0.5 U
CHLOROBENZENE	0.5 U	0.5 U	0.5 U
CHLOROETHANE	0.5 U	0.5 U	0.5 U
CHLOROFORM	0.5 U	0.5 U	0.5 U
CHLOROMETHANE	0.5 U	0.5 U	0.5 U
CIS-1,2-DICHLOROETHYLENE	0.5 U	0.5 U	0.5 U
CIS-1,3-DICHLOROPROPENE	0.5 U	0.5 U	0.5 U
CYCLOHEXANE	0.5 U	0.5 U	0.5 U
DIBROMOCHLOROMETHANE	0.5 U	0.5 U	0.5 U
DICHLORODIFLUOROMETHANE	0.5 U	0.5 U	0.5 U
ETHYLBENZENE	0.5 U	0.5 U	0.5 U
ISOPROPYLBENZENE	0.5 U	0.5 U	0.5 U

Table 6
Analytical Results for Groundwater - April - May 2011

Location ID Sample ID Sample Date	MW-24 AN01852 4/28/2011	MW-29 AN01855 5/2/2011	PZ-1 AN01847 4/28/2011
Chemical - ug/L			
M, P XYLENES	0.5 U	0.5 U	0.5 U
METHYL ACETATE	2 U	2 U	2 U
METHYL ETHYL KETONE	5 U	5 U	5 U
METHYL ISOBUTYL KETONE	5 U	5 U	5 U
METHYLCYCLOHEXANE	0.5 U	0.5 U	0.5 U
METHYLENE CHLORIDE	0.5 U	0.5 U	0.5 U
O-XYLENE	0.5 U	0.5 U	0.5 U
STYRENE	0.5 U	0.5 U	0.5 U
TERT-BUTYL METHYL ETHER	2 UJ	2 UJ	2 UJ
TETRACHLOROETHYLENE (PCE)	1	0.5 U	0.5 U
TOLUENE	0.5 U	0.5 U	0.5 U
TRANS-1,2-DICHLOROETHENE	0.5 U	0.5 U	0.5 U
TRANS-1,3-DICHLOROPROPENE	0.5 U	0.5 U	0.5 U
TRICHLOROETHYLENE (TCE)	0.62	0.5 U	0.5 U
TRICHLOROFLUOROMETHANE	0.5 U	0.5 U	0.5 U
VINYL CHLORIDE	0.5 U	0.5 U	0.5 U

Notes:

J - estimated value

U - non-detect

ug/L - micrograms per Liter

Table 7
Summary of Chemicals of Concern and Medium-Specific Exposure Point Concentrations

Scenario Timeframe: Future Medium: Groundwater Exposure Medium: Groundwater

Exposure Point	Chemical of Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
Groundwater (Tap Water)	cis-1,2-Dichloroethene	ug/L	2.5E+03	7.1E+02	9.4E+03 J	7.1E+02	ug/L	95% KM (t)	(2)
	Tetrachloroethene	ug/L	5.9E+03	1.1E+04	3.0E+04	1.1E+04	ug/L	99% KM (Chebyshev)	(2)
	Trichloroethene	ug/L	2.3E+03	9.2E+02	1.0E+04	9.2E+02	ug/L	95% KM (t)	(2)
	Vinyl chloride	ug/L	--	--	5.9E+01	5.9E+01	ug/L	Maximum Detected Concentration	(1)

(1) The maximum detected concentration was used as the EPC because there were less than 4 detected results.

(2) Distribution tests are inconclusive (data are not normal, log-normal, or gamma-distributed).

NA = Not applicable

ug/L = Microgram per liter

J = Analyte was detected, but should be considered an estimated value.

Table 7
Summary of Chemicals of Concern and Medium-Specific Exposure Point Concentrations

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Bathroom Air

Exposure Point	Chemical of Concern	Exposure Point Concentration		
		Value (1)	Value (2)	Units
Water Vapors in Bathroom Air	cis-1,2-Dichloroethene	2.1E+01	3.7E+01	mg/m ³
	Tetrachloroethene	3.3E+02	5.8E+02	mg/m ³
	Trichloroethene	2.7E+01	4.8E+01	mg/m ³
	Vinyl chloride	1.7E+00	3.1E+00	mg/m ³

(1) Adult shower air concentration.

(2) Child shower air concentration.

NA = Not applicable

ug/L = Microgram per liter

mg/m³ = milligram per cubic meter

Table 7
Summary of Chemicals of Concern and Medium-Specific Exposure Point Concentrations

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater (Construction Worker)

Exposure Point	Chemical of Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
(Excavation/Trench)	cis-1,2-Dichloroethene	ug/L	9.7E+00	--	1.2E+01	1.2E+01	ug/L	Maximum Detected Concentration	(1)
	Tetrachloroethene	ug/L	3.5E+02	6.1E+02	2.3E+03	6.1E+02	ug/L	97.5% KM (Chebyshev)	(2)
	Trichloroethene	ug/L	3.0E+01	--	7.0E+01	7.0E+01	ug/L	Maximum Detected Concentration	(1)
	Vinyl chloride	ug/L	5.9E+01	--	5.9E+01	5.9E+01	ug/L	Maximum Detected Concentration	(1)

(1) The maximum detected concentration was used as the EPC because there were less than 4 detected results.

(2) Distribution tests are inconclusive (data are not normal, log-normal, or gamma-distributed).

NA = Not applicable

ug/L = Microgram per liter

Table 7
Summary of Chemicals of Concern and Medium-Specific Exposure Point Concentrations

Scenario Timeframe: Future Medium: Groundwater Exposure Medium: Ambient Air

Exposure Point	Chemical of Concern	Exposure Point Concentration in Ambient Air			
		Value	Units	Statistic	Rationale
(Excavation/Trench)	cis-1,2-Dichloroethene	5.5E-04	mg/m ³	Calculated using Two-Film Model	(1)
	Tetrachloroethene	2.5E-02	mg/m ³	Calculated using Two-Film Model	(1)
	Trichloroethene	3.0E-03	mg/m ³	Calculated using Two-Film Model	(1)
	Vinyl chloride	2.9E-03	mg/m ³	Calculated using Two-Film Model	(1)

(1) Concentrations in ambient air were calculated using the Two-Film Model (EPA, 1994).

mg/m³ = milligrams per cubic meter

Sources:

EPA, 1994: *Air Emissions and Models for Waste and Wastewater*. Office of Air Quality Planning and Standards. Research Triangle Park, NC. USEPA, EPA/453/R-94/080A.

Table 8
Risk Characterization Summary: Carcinogens

Scenario Timeframe: Future							
Receptor Population: Resident							
Receptor Age: Adult/Child Aggregate							
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Ingestion	Dermal	Inhalation	Exposure Routes Total
Groundwater	Groundwater	Groundwater (Tap Water and Water Vapors in Bathroom Air)	Benzene	5.23E-06	7.95E-07	2.10E-05	2.70E-05
			cis-1,2-Dichloroethene	N/A	N/A	N/A	N/A
			Methyl tert-butyl ether	6.99E-07	1.60E-08	2.86E-06	3.57E-06
			Tetrachloroethene	8.61E-02	5.19E-02	2.70E-02	1.65E-01
			Trichloroethene	8.12E-05	1.34E-05	7.60E-04	8.55E-04
			Vinyl chloride	1.02E-03	4.89E-05	1.50E-04	1.22E-03
Receptor Population Risk = 2E-01							
Scenario Timeframe: Future							
Receptor Population: Commercial Worker							
Receptor Age: Adult							
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Ingestion	Dermal	Inhalation	Exposure Routes Total
Groundwater	Groundwater	Groundwater (Tap Water)	Benzene	1.22E-06	3.28E-08	N/A	1.26E-06
			cis-1,2-Dichloroethene	N/A	N/A	N/A	N/A
			Methyl tert-butyl ether	1.64E-07	6.63E-10	N/A	1.64E-07
			Tetrachloroethene	2.09E-02	2.24E-03	N/A	2.31E-02
			Trichloroethene	1.90E-05	5.63E-07	N/A	1.96E-05
			Vinyl chloride	1.48E-04	1.35E-06	N/A	1.50E-04
Receptor Population Risk = 2E-02							

Table 8
Risk Characterization Summary: Carcinogens

Scenario Timeframe: Future						
Receptor Population: Construction Worker						
Receptor Age: Adult						
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Dermal	Inhalation	Exposure Routes Total
Groundwater	Groundwater	Groundwater (Excavation / Trench)	Benzene	3.60E-09	9.80E-09	1.34E-08
			cis-1,2-Dichloroethene	N/A	N/A	0.00E+00
			Methyl tert-butyl ether	2.54E-11	4.10E-10	4.35E-10
			Tetrachloroethene	3.39E-06	2.40E-07	3.63E-06
			Trichloroethene	1.34E-09	9.80E-09	1.11E-08
			Vinyl chloride	5.82E-08	2.10E-08	7.92E-08
Receptor Population Risk = 4E-06						

Notes:
N/A - not applicable

Table 8
Risk Characterization Summary: Carcinogens

Scenario Timeframe: Future							
Receptor Population: Resident							
Receptor Age: Adult/Child Aggregate							
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Ingestion	Dermal	Inhalation	Exposure Routes Total
Groundwater	Groundwater	Groundwater (Tap Water and Water Vapors in Bathroom Air)	Benzene	5.23E-06	7.95E-07	2.10E-05	2.70E-05
			cis-1,2-Dichloroethene	N/A	N/A	N/A	N/A
			Methyl tert-butyl ether	6.99E-07	1.60E-08	2.86E-06	3.57E-06
			Tetrachloroethene	8.61E-02	5.19E-02	2.70E-02	1.65E-01
			Trichloroethene	8.12E-05	1.34E-05	7.60E-04	8.55E-04
			Vinyl chloride	1.02E-03	4.89E-05	1.50E-04	1.22E-03
Receptor Population Risk = 2E-01							
Scenario Timeframe: Future							
Receptor Population: Commercial Worker							
Receptor Age: Adult							
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Ingestion	Dermal	Inhalation	Exposure Routes Total
Groundwater	Groundwater	Groundwater (Tap Water)	Benzene	1.22E-06	3.28E-08	N/A	1.26E-06
			cis-1,2-Dichloroethene	N/A	N/A	N/A	N/A
			Methyl tert-butyl ether	1.64E-07	6.63E-10	N/A	1.64E-07
			Tetrachloroethene	2.09E-02	2.24E-03	N/A	2.31E-02
			Trichloroethene	1.90E-05	5.63E-07	N/A	1.96E-05
			Vinyl chloride	1.48E-04	1.35E-06	N/A	1.50E-04
Receptor Population Risk = 2E-02							

Table 8
Risk Characterization Summary: Carcinogens

Scenario Timeframe: Future						
Receptor Population: Construction Worker						
Receptor Age: Adult						
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Dermal	Inhalation	Exposure Routes Total
Groundwater	Groundwater	Groundwater (Excavation / Trench)	Benzene	3.60E-09	9.80E-09	1.34E-08
			cis-1,2-Dichloroethene	N/A	N/A	0.00E+00
			Methyl tert-butyl ether	2.54E-11	4.10E-10	4.35E-10
			Tetrachloroethene	3.39E-06	2.40E-07	3.63E-06
			Trichloroethene	1.34E-09	9.80E-09	1.11E-08
			Vinyl chloride	5.82E-08	2.10E-08	7.92E-08
						Receptor Population Risk = 4E-06

Notes:
N/A - not applicable

Table 9
Risk Characterization Summary: Non-Carcinogens

Scenario Timeframe: Future								
Receptor Population: Resident								
Receptor Age: Adult								
Non-Carcinogenic Hazard Quotients								
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Groundwater	Groundwater	Groundwater (Tap Water and Water Vapor in Bathroom Air)	Benzene	Blood	4.36E-02	6.63E-03	1.40E-01	1.90E-01
			cis-1,2-Dichloroethene	Kidney (Ingestion)	9.67E+00	8.62E-01	N/A	1.05E+01
			Methyl tert-butyl ether	Liver, Kidney (Inhalation)	N/A	N/A	5.90E-03	5.90E-03
			Tetrachloroethene	Liver (Ingestion); CNS (Inhalation)	3.06E+01	1.84E+01	2.80E+01	7.70E+01
				Liver, Kidney, Fetus (Ingestion); CNS, Liver, Kidney, Reproductive, Developmental (Inhalation)				
			Trichloroethene		8.42E+01	1.41E+01	6.30E+01	1.61E+02
			Vinyl chloride	Liver	5.39E-01	2.87E-02	4.00E-01	9.67E-01
Receptor Total = 3E+02								

Table 9
Risk Characterization Summary: Non-Carcinogens

Scenario Timeframe: Future								
Receptor Population: Resident								
Receptor Age: Child								
Non-Carcinogenic Hazard Quotients								
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Groundwater	Groundwater	Groundwater (Tap Water and Water Vapor in Bathroom Air)	Benzene	Blood	1.02E-01	1.56E-02	4.40E-01	5.57E-01
			cis-1,2-Dichloroethene	Kidney (Ingestion)	2.26E+01	2.00E+00	N/A	2.46E+01
			Methyl tert-butyl ether	Liver, Kidney (Inhalation)	N/A	N/A	1.80E-02	-1.80E-02
			Tetrachloroethene	Liver (Ingestion); CNS (Inhalation)	7.14E+01	4.14E+01	8.60E+01	1.99E+02
				Liver, Kidney, Fetus (Ingestion); CNS, Liver, Kidney, Reproductive, Developmental (Inhalation)				
			Trichloroethene		1.96E+02	3.18E+01	1.90E+02	4.18E+02
			Vinyl chloride	Liver	1.26E+00	6.82E-02	1.20E+00	2.53E+00
Receptor Total = 6E+02								

Table 9
Risk Characterization Summary: Non-Carcinogens

Scenario Timeframe: Future								
Receptor Population: Commercial Worker								
Receptor Age: Adult								
Non-Carcinogenic Hazard Quotients								
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Groundwater	Groundwater	Groundwater (Tap Water)	Benzene	Blood	1.6E-02	4.17E-04	N/A	1.60E-02
			cis-1,2-Dichloroethene	Kidney	3.45E+00	5.43E-02	N/A	3.50E+00
			Methyl tert-butyl ether	N/A	N/A	N/A	N/A	N/A
			Tetrachloroethene	Liver	1.1E+01	1.16E+00	N/A	1.21E+01
			Trichloroethene	Liver, Kidney, Fetus	3.0E+01	8.90E-01	N/A	3.09E+01
			Vinyl chloride	Liver	1.9E-01	1.76E-03	N/A	1.94E-01
								Receptor Total = 5E+01

Table 9
Risk Characterization Summary: Non-Carcinogens

Scenario Timeframe: Future							
Receptor Population: Construction Worker							
Receptor Age: Adult							
Non-Carcinogenic Hazard Quotients							
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Dermal	Inhalation	Exposure Routes Total
Groundwater	Groundwater	Groundwater (Excavation / Trench)	Benzene	Blood	1.15E-03	2.9E-03	4.05E-03
			cis-1,2-Dichloroethene	Kidney (Ingestion)	8.34E-04	N/A	8.34E-04
			Methyl tert-butyl ether	Liver, Kidney (Inhalation)	N/A	3.7E-05	3.70E-05
			Tetrachloroethene	Liver (Ingestion); CNS (Inhalation)	4.40E-02	1.1E-02	5.50E-02
			Trichloroethene	Liver, Kidney, Fetus (Ingestion); CNS, Liver, Kidney, Reproductive, Developmental (Inhalation)	5.29E-02	3.4E-02	8.69E-02
			Vinyl chloride	Liver	1.88E-03	3.3E-03	5.18E-03
							Receptor Total = 2E-01

Notes:

N/A - not applicable

Table 10
Cancer Toxicity Data Summary

Pathway: Ingestion, Dermal						
Chemical of Concern	Oral Cancer Slope Factor	Dermal Cancer Slope Factor	Slope Factor Units	Weight of Evidence/Cancer Guideline Description	Source	Date
Benzene	5.5E-02	5.5E-02	(mg/kg-day) ⁻¹	A	IRIS	5/9/2011
cis-1,2-Dichloroethene	N/A	N/A	N/A	N/A	N/A	N/A
Methyl tert-butyl ether	1.8E-03	1.8E-03	(mg/kg-day) ⁻¹	N/A	Cal/EPA	5/9/2011
Tetrachloroethene	5.4E-01	5.4E-01	(mg/kg-day) ⁻¹	N/A	Cal/EPA	5/9/2011
Trichloroethene	5.9E-03	5.9E-03	(mg/kg-day) ⁻¹	N/A	Cal/EPA	5/9/2011
Vinyl chloride (adulthood)	7.2E-01	7.2E-01	(mg/kg-day) ⁻¹	A	IRIS	5/9/2011
Vinyl chloride (from birth)	1.5E+00	1.5E+00	(mg/kg-day) ⁻¹	A	IRIS	5/9/2011

Pathway: Inhalation					
Chemical of Concern	Unit Risk	Units	Weight of Evidence / Cancer Guideline Description	Source	Date
Benzene	7.8E-06	(ug/m ³) ⁻¹	A	IRIS	5/9/2011
cis-1,2-Dichloroethene	N/A	N/A	N/A	N/A	N/A
Methyl tert-butyl ether	2.6E-07	(ug/m ³) ⁻¹	N/A	Cal/EPA	5/9/2011
Tetrachloroethene	5.9E-06	(ug/m ³) ⁻¹	N/A	Cal/EPA	5/9/2011
Trichloroethene	2.0E-06	(ug/m ³) ⁻¹	N/A	Cal/EPA	5/9/2011
Vinyl chloride (adulthood) (1)	4.4E-06	(ug/m ³) ⁻¹	A	IRIS	5/9/2011
Vinyl chloride (from birth) (1)	8.8E-06	(ug/m ³) ⁻¹	A	IRIS	5/9/2011

Notes:

Cal/EPA - California Environmental Protection Agency

IRIS - Integrated Risk Information System

N/A - not available

Weight of Evidence definition: Group A chemicals (known human carcinogens) are agents for which there is sufficient evidence to support the causal association between exposure to the agents in humans and cancer.

Table 11
Non-Cancer Toxicity Data Summary

Pathway: Ingestion, Dermal									
Chemical of Concern	Chronic / Subchronic	Oral RfD Value	Oral RfD Units	Dermal RfD	Dermal RfD Units	Primary Target Organ	Combined Uncertainty / Modifying Factors	Sources of RfD: Target Organ	Dates of RfD: Target Organ
Benzene	Chronic	4.0E-03	mg/kg-day	4.0E-03	mg/kg-day	Blood	300 / 1	IRIS	5/9/2011
Benzene	Subchronic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
cis-1,2-Dichloroethene	Chronic	2.0E-03	mg/kg-day	2.0E-03	mg/kg-day	Increased relative kidney weight in male rats	3000	IRIS	5/9/2011
cis-1,2-Dichloroethene	Subchronic	1.0E-01	mg/kg-day	1.0E-01	mg/kg-day	Blood	300	HEAST	7/31/1997
Methyl tert-butyl ether	Chronic/Subchronic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tetrachloroethene	Chronic	1.0E-02	mg/kg-day	1.0E-02	mg/kg-day	Liver	1000 / 1	IRIS	5/9/2011
Tetrachloroethene	Subchronic	1.0E-01	mg/kg-day	1.0E-01	mg/kg-day	Liver	100	HEAST	7/31/1997
Trichloroethene	Chronic	3.0E-04	mg/kg-day	3.0E-04	mg/kg-day	Liver, Kidney, Fetus	N/A	NCEA	08/2001
Trichloroethene	Subchronic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Vinyl chloride	Chronic	3.0E-03	mg/kg-day	3.0E-03	mg/kg-day	Liver	30 / 1	IRIS	5/9/2011
Vinyl chloride	Subchronic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Pathway: Inhalation									
Chemical of Concern	Chronic / Subchronic	Inhalation RfC	Units	Primary Target Organ	Combined Uncertainty / Modifying Factors	Sources of RfC: Target Organ	Dates of RfC: Target Organ		
Benzene	Chronic	3.0E-02	mg/m ³	Blood	300 / 1	IRIS	5/9/2011		
Benzene	Subchronic	N/A	N/A	N/A	N/A	N/A	N/A		
cis-1,2-Dichloroethene	Chronic/Subchronic	N/A	N/A	N/A	N/A	N/A	N/A		
Methyl tert-butyl ether	Chronic	3.0E+00	mg/m ³	Liver, Kidney	100/1	IRIS	5/9/2011		
Methyl tert-butyl ether	Subchronic	N/A	N/A	N/A	N/A	N/A	N/A		
Tetrachloroethene	Chronic	2.7E-01	mg/m ³	Neurological	10 / 1	ATSDR	5/9/2011		
Tetrachloroethene	Subchronic	N/A	N/A	N/A	N/A	N/A	N/A		
Trichloroethene	Chronic	6.0E-01	mg/m ³	Nervous System, Eyes	N/A	Cal/EPA	5/9/2011		
Trichloroethene	Chronic	1.0E-02	mg/m ³	CNS, liver, kidney, male reproductive system, and embryo, fetuses, and neonates (development toxicity)	N/A	NY	10/2006		
Trichloroethene	Subchronic	N/A	N/A	N/A	N/A	N/A	N/A		
Vinyl chloride	Chronic	1.0E-01	mg/m ³	Liver	30/1	IRIS	5/9/2011		
Vinyl chloride	Subchronic	N/A	N/A	N/A	N/A	N/A	N/A		

Notes:

ATSDR - Agency for Toxic Substances and Disease Registry

Cal/EPA - California Environmental Protection Agency

HEAST - Health Effects Assessment Summary Tables

IRIS - Integrated Risk Information System

mg/kg-day - milligrams per kilogram per day

mg/m³ - milligrams per cubic meter

N/A - not available

NCEA - National Center for Environmental Assessment

NY - New York State Department of Health

Table 11
Non-Cancer Toxicity Data Summary

Pathway: Ingestion, Dermal									
Chemical of Concern	Chronic / Subchronic	Oral RfD Value	Oral RfD Units	Dermal RfD	Dermal RfD Units	Primary Target Organ	Combined Uncertainty / Modifying Factors	Sources of RfD: Target Organ	Dates of RfD: Target Organ
Benzene	Chronic	4.0E-03	mg/kg-day	4.0E-03	mg/kg-day	Blood	300 / 1	IRIS	5/9/2011
Benzene	Subchronic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
cis-1,2-Dichloroethene	Chronic	2.0E-03	mg/kg-day	2.0E-03	mg/kg-day	Increased relative kidney weight in male rats	3000	IRIS	5/9/2011
cis-1,2-Dichloroethene	Subchronic	1.0E-01	mg/kg-day	1.0E-01	mg/kg-day	Blood	300	HEAST	7/31/1997
Methyl tert-butyl ether	Chronic/Subchronic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tetrachloroethene	Chronic	1.0E-02	mg/kg-day	1.0E-02	mg/kg-day	Liver	1000 / 1	IRIS	5/9/2011
Tetrachloroethene	Subchronic	1.0E-01	mg/kg-day	1.0E-01	mg/kg-day	Liver	100	HEAST	7/31/1997
Trichloroethene	Chronic	3.0E-04	mg/kg-day	3.0E-04	mg/kg-day	Liver, Kidney, Fetus	N/A	NCEA	08/2001
Trichloroethene	Subchronic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Vinyl chloride	Chronic	3.0E-03	mg/kg-day	3.0E-03	mg/kg-day	Liver	30 / 1	IRIS	5/9/2011
Vinyl chloride	Subchronic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pathway: Inhalation									
Chemical of Concern	Chronic / Subchronic	Inhalation RfC	Units	Primary Target Organ	Combined Uncertainty / Modifying Factors	Sources of RfC: Target Organ	Dates of RfC: Target Organ		
Benzene	Chronic	3.0E-02	mg/m ³	Blood	300 / 1	IRIS	5/9/2011		
Benzene	Subchronic	N/A	N/A	N/A	N/A	N/A	N/A		
cis-1,2-Dichloroethene	Chronic/Subchronic	N/A	N/A	N/A	N/A	N/A	N/A		
Methyl tert-butyl ether	Chronic	3.0E+00	mg/m ³	Liver, Kidney	100/1	IRIS	5/9/2011		
Methyl tert-butyl ether	Subchronic	N/A	N/A	N/A	N/A	N/A	N/A		
Tetrachloroethene	Chronic	2.7E-01	mg/m ³	Neurological	10 / 1	ATSDR	5/9/2011		
Tetrachloroethene	Subchronic	N/A	N/A	N/A	N/A	N/A	N/A		
Trichloroethene	Chronic	6.0E-01	mg/m ³	Nervous System, Eyes	N/A	Cal/EPA	5/9/2011		
Trichloroethene	Chronic	1.0E-02	mg/m ³	CNS, liver, kidney, male reproductive system, and embryo, fetuses, and neonates (development toxicity)	N/A	NY	10/2006		
Trichloroethene	Subchronic	N/A	N/A	N/A	N/A	N/A	N/A		
Vinyl chloride	Chronic	1.0E-01	mg/m ³	Liver	30/1	IRIS	5/9/2011		
Vinyl chloride	Subchronic	N/A	N/A	N/A	N/A	N/A	N/A		

Notes:

ATSDR - Agency for Toxic Substances and Disease Registry

Cal/EPA - California Environmental Protection Agency

HEAST - Health Effects Assessment Summary Tables

IRIS - Integrated Risk Information System

mg/kg-day - milligrams per kilogram per day

mg/m³ - milligrams per cubic meter

N/A - not available

NCEA - National Center for Environmental Assessment

NY - New York State Department of Public Health

Table 12
Cleanup Levels for Chemicals of Concern

Media: Groundwater		
Chemical of Concern	Cleanup Level (ppb)	Basis for Cleanup Level
cis-1,2-dichloroethylene	5	New York State Water Quality Standards
Tetrachloroethylene (PCE)	5	New York State Water Quality Standards and Federal MCL
Trichloroethylene (TCE)	5	New York State Water Quality Standards and Federal MCL
Vinyl Chloride	2	New York State Water Quality Standards and Federal MCL

Notes:

Federal MCL is derived from CFR Title 40, Chapter 1, Part 141 National Primary Drinking Water Regulations, 141.61 Maximum Contaminant Levels for Organic Contaminants

New York State Water Quality Standards derived from NYCRR, Title 6, Chapter X - Division of Water, Part 703: Surface Water and Groundwater Quality Standards and Groundwater Effluent Limitations, Table 1

ppb - parts per billion

Table 13
Chemical-Specific Groundwater ARARs and TBCs

Constituent Information		Federal Safe Drinking Water Act (1)		New York State Water Quality Standards for Class GA (Groundwater) (2)	Preliminary Remediation Goal (3)	Maximum Concentration Greater than Remediation Goal
Parameter	Range of Detections in Groundwater (ug/L)	MCL (ug/L)	MCLG (ug/L)	NYCRR, Title 6, Part 703, Table 1 (ug/L)	(ug/L)	
1,1,1-Trichloroethane	ND	200	200	5	5	No
1,1,2,2-Tetrachloroethane	ND	NS	NS	5	5	No
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	NS	NS	NS	N/A	No
1,1,2-Trichloroethane	ND	5	3	1	1	No
1,1-Dichloroethane	ND - 0.54	NS	NS	5	5	No
1,1-Dichloroethene	ND - 3.3	7	7	5	5	No
1,2,3-Trichlorobenzene	ND	NS	NS	NS	N/A	No
1,2,4-Trichlorobenzene	ND	70	70	NS	70	No
1,2-Dibromo-3-Chloropropane	ND	0.2	NS	0.04	0.04	No
1,2-Dibromoethane	ND	NS	NS	0.0006	0.0006	No
1,2-Dichlorobenzene	ND	NS	NS	3	3	No
1,2-Dichloroethane	ND	5	NS	0.6	0.6	No
1,2-Dichloropropane	ND	5	NS	1	1	No
1,3-Dichlorobenzene	ND	NS	NS	3	3	No
1,4-Dichlorobenzene	ND	NS	NS	3	3	No
2-Hexanone	ND	NS	NS	NS	N/A	No
Acetone	ND	NS	NS	NS	N/A	No
Benzene	ND - 7	5	NS	1	1	Yes
Bromochloromethane	ND	NS	NS	5	5	No
Bromodichloromethane	ND	NS	NS	NS	N/A	No
Bromoform	ND	NS	NS	NS	N/A	No
Bromomethane	ND	NS	NS	5	5	No
Carbon Disulfide	ND - 3.9	NS	NS	60	60	No
Carbon Tetrachloride	ND	5	NS	5	5	No
Chlorobenzene	ND	100	100	5	5	No

Table 13
Chemical-Specific Groundwater ARARs and TBCs

Constituent Information		Federal Safe Drinking Water Act (1)		New York State Water Quality Standards for Class GA (Groundwater) (2)	Preliminary Remediation Goal (3)	Maximum Concentration Greater than Remediation Goal
Parameter	Range of Detections in Groundwater (ug/L)	MCL (ug/L)	MCLG (ug/L)	NYCRR, Title 6, Part 703, Table 1 (ug/L)	(ug/L)	
Chloroethane	ND	NS	NS	5	5	No
Chloroform	ND - 1.9	NS	NS	7	7	No
Chloromethane	ND - 1.2	NS	NS	5	5	No
Cis-1,2-Dichloroethylene	ND - 9400	70	70	5	5	Yes
Cis-1,3-Dichloropropene	ND	NS	NS	NS	N/A	No
Cyclohexane	ND - 25	NS	NS	NS	N/A	No
Dibromochloromethane	ND	NS	NS	NS	N/A	No
Dichlorodifluoromethane	ND	NS	NS	5	5	No
Ethylbenzene	ND - 17	700	700	5	5	Yes
Isopropylbenzene	ND - 7.2	NS	NS	5	5	Yes
M, P Xylenes	ND	10,000 (total)	10,000 (total)	NS	10,000 (total)	No
Methyl Acetate	ND	NS	NS	NS	N/A	No
Methyl Ethyl Ketone	ND	NS	NS	NS	N/A	No
Methyl Isobutyle Ketone	ND	NS	NS	NS	N/A	No
Methylcyclohexane	ND - 17	NS	NS	NS	N/A	No
Methylene Chloride	ND - 2.1	NS	NS	5	5	No
O-Xylene	ND	10,000 (total)	10,000 (total)	5	5	No
Styrene	ND - 1.2	100	100	5	5	No
Methyl Tert-Butyl Ether (MTBE)	ND - 180	NS	NS	NS	N/A	No
Tetrachloroethylene (PCE)	ND - 30,000	5	NS	5	5	Yes
Toluene	ND - 3.3	1000	1000	5	5	No
Trans-1,2-Dichloroethene	ND - 0.56	NS	NS	5	5	No
Trans-1,3-Dichloropropene	ND	NS	NS	NS	N/A	No
Trichloroethylene (TCE)	ND - 10,000	5	NS	5	5	Yes
Trichlorofluoromethane	ND	NS	NS	5	5	No

Table 13
Chemical-Specific Groundwater ARARs and TBCs

Constituent Information		Federal Safe Drinking Water Act (1)		New York State Water Quality Standards for Class GA (Groundwater) (2)	Preliminary Remediation Goal (3)	Maximum Concentration Greater than Remediation Goal
Parameter	Range of Detections in Groundwater (ug/L)	MCL (ug/L)	MCLG (ug/L)	NYCRR, Title 6, Part 703, Table 1 (ug/L)	(ug/L)	
Vinyl Chloride	ND - 59	2	NS	2	2	Yes

Notes:

1. CFR Title 40, Chapter 1, Part 141 National Primary Drinking Water Regulations, 141.61 Maximum Contaminant Levels for Organic Contaminants

2. NYCRR, Title 6, Chapter X - Division of Water, Part 703: Surface Water and Groundwater Quality Standards and Groundwater Effluent Limitations, Table 1

3. Preliminary Remediation Goal is the most stringent of the ARARs listed.

MCL - maximum contaminant level

MCLG - maximum contaminant level goal

N/A - not applicable

ND - not detected

NS - no standard

ug/L - micrograms per liter

Table 14
Cost Estimate for Alternative 4 - Groundwater Pump and Treat

Site:	Peninsula Boulevard Groundwater Plume	Description:	Alternative G6 consists of pumping groundwater to remove mass from high concentration areas of the aquifer and to establish hydraulic control of the aquifer to minimize off-Site migration of the groundwater plume. Extracted groundwater will be treated via an air stripper prior to discharge to adjacent surface water. The air stream will be treated using vapor phase GAC.
Location:	Town of Hempstead, Village of Hewlett		
Phase:	Feasibility Study (-30% - +50%)		
Base Year:	2011		
Date:	April 26, 2011		

Item No.	Description	Quantity	Unit	Unit Cost	Total	Notes
CAPITAL COSTS:						
1	Pre-Design Investigation					
1.1	Well Driller Mob/Demob	1	LS	\$ 7,000.00	\$ 7,000	
1.2	Monitoring Well Installation- Shallow	5	EA	\$ 2,000.00	\$ 10,000	2-inch diameter; 25 ft deep.
1.3	Monitoring Well Installation- Deep	5	EA	\$ 3,750.00	\$ 18,750	2-inch diameter; 75 ft deep.
1.4	Groundwater Sampling	30	EA	\$ 1,500	\$ 45,000	
1.5	Pre-Construction Survey	1	LS	\$ 5,500	\$ 5,500	Aerial/Topographic Survey.
1.6	Aquifer Pump Test	1	LS	\$ 25,000	\$ 25,000	At 4 extraction wells, four location set ups, transducers, 72-hour test frac tank, discharge, and reporting.
1.7	Pilot Test	1	LS	\$ 15,000	\$ 15,000	Air stripper and carbon evaluation.
1.8	Data Reduction, Evaluation, and Reporting	1	LS	\$ 15,000	\$ 15,000	
1.9	IDW	1	LS	\$ 20,000	\$ 20,000	Soil cuttings and groundwater waste from well installation and pumping tests. Assumes discharge to sewer system.
	Sub-Total				\$ 161,250	
2	Mobilization and Demobilization					
2.1	Construction Equipment and Personnel	1	LS	\$ 50,000	\$ 50,000	
2.2	Submittals/Implementation Plans	1	LS	\$ 20,000	\$ 20,000	QAPP, HASP, shop dwgs and work plans.
2.3	Post Construction Submittals	1	LS	\$ 15,000	\$ 15,000	As-builts, warranties, etc.
	Sub-Total				\$ 85,000	
3	Monitoring, Sampling, Testing and Analysis					
3.1	Well Driller Mob/Demob	1	LS	\$ 7,000	\$ 7,000	
3.2	Extraction Well Installation - Shallow	6	EA	\$ 4,950	\$ 29,700	6-inch diameter to 25 ft bgs. Stainless steel well screens.
3.3	Extraction Well Installation - Deep	2	EA	\$ 15,750	\$ 31,500	6-inch diameter to 75 ft bgs. Stainless steel well screens.
3.4	Performance Well Installation - Shallow	20	EA	\$ 2,000	\$ 40,000	2-inch diameter to 25 feet bgs.
3.5	Performance Well Installation - Deep	4	EA	\$ 3,750	\$ 15,000	2-inch diameter to 75 feet bgs.
3.6	Extraction Pump, Transducer, Concrete Vault	8	LS	\$ 2,000	\$ 16,000	
3.7	IDW	1	LS	\$ 20,000	\$ 20,000	Soil cuttings and groundwater waste from well installations and development.
3.8	Well Survey	2	Day	\$ 1,500	\$ 3,000	
	Sub-Total				\$ 162,200	
4	Conveyance Piping					
4.1	Trenching, Bedding, Pipe	4,000	LF	\$ 150	\$ 600,000	3-inch HDPE double walled pipe.
4.2	Vaults at Junctions	3	EA	\$ 2,000	\$ 6,000	
4.3	Surface Restoration	1,400	SY	\$ 40	\$ 56,000	
4.4	Effluent Discharge Pipe	300	LF	\$ 150	\$ 45,000	
4.5	Soil Disposal	450	Tons	\$ 100	\$ 45,000	1 foot x 2 foot wide by total length x 1.5 tons/CY.
	Sub-Total				\$ 752,000	
5	Treatment System					
5.1	Equalization Tank	1	EA	\$ 7,500	\$ 7,500	
5.2	Transfer Pumps	2	EA	\$ 2,500	\$ 5,000	
5.3	Bag Filter	2	EA	\$ 1,500	\$ 3,000	
5.4	Air Stripper	1	EA	\$ 10,000	\$ 10,000	
5.5	Interconnection Piping and Valves	1	LS	\$ 12,000	\$ 12,000	
5.6	Meters and Instrumentation	1	LS	\$ 16,000	\$ 16,000	
5.7	PLC and SCADA System	1	LS	\$ 22,000	\$ 22,000	
5.8	Blower	1	EA	\$ 30,000	\$ 30,000	1,800 cfm.
5.9	Vapor GAC	2	EA	\$ 12,000	\$ 24,000	
5.10	Training	1	LS	\$ 22,000	\$ 22,000	
	Sub-Total				\$ 151,500	

Table 14
Cost Estimate for Alternative 4 - Groundwater Pump and Treat

Site:	Peninsula Boulevard Groundwater Plume	Description:	Alternative G6 consists of pumping groundwater to remove mass from high concentration areas of the aquifer and to establish hydraulic control of the aquifer to minimize off-Site migration of the groundwater plume. Extracted groundwater will be treated via an air stripper prior to discharge to adjacent surface water. The air stream will be treated using vapor phase GAC.
Location:	Town of Hempstead, Village of Hewlett		
Phase:	Feasibility Study (-30% - +50%)		
Base Year:	2011		
Date:	April 26, 2011		

Item No.	Description	Quantity	Unit	Unit Cost	Total	Notes
6	Treatment Plant Building					
6.1	Concrete Foundation	1	LS	\$ 25,000	\$ 25,000	
6.2	Steel Building	1	LS	\$ 50,000	\$ 50,000	50 ft x 50 ft building
6.3	HVAC System	1	LS	\$ 30,000	\$ 30,000	
6.4	Windows and Doors	1	LS	\$ 20,000	\$ 20,000	
6.5	Electrical Power and Lighting	1	LS	\$ 20,000	\$ 20,000	
	Sub-Total				\$ 145,000	
7	System Start-up and Prove-out					
7.1	System Start-up	1	LS	\$ 25,000	\$ 25,000	
	Sub-Total				\$ 25,000	
8	LTM and Institutional Controls					
	<u>Institutional Controls</u>					
8.1	Institutional Control and Site Management Plan	1	EA	\$ 60,000	\$ 60,000	Environmental easement/deed restriction, legal fees.
8.2	Site Information Database	1	LS	\$ 25,000	\$ 25,000	Setup data management system.
	<u>LTM</u>					
8.3	Sampling and Reporting	80	EA	\$ 1,500	\$ 120,000	Semi-annually for 40 wells.
8.4	Fate and Transport Modeling/Calculation	1	LS	\$ 25,000	\$ 25,000	
8.5	Reporting and Monitoring Program Development	1	LS	\$ 25,000	\$ 25,000	
	Sub-Total				\$ 255,000	
	Sub-Total				\$ 1,736,950	Sub-Total All Construction Costs.
	Contingency	25%			\$ 434,000	10% scope + 15% bid.
	Sub-Total				\$ 2,170,950	
	Project Management	5%			\$ 109,000	
	Remedial Design	10%			\$ 217,000	
	Permitting	5%			\$ 109,000	
	Construction Management	8%			\$ 174,000	
	Construction Oversight	10%			\$ 217,000	
	TOTAL CAPITAL COST				\$ 2,996,950	

Table 14
Cost Estimate for Alternative 4 - Groundwater Pump and Treat

Site:	Peninsula Boulevard Groundwater Plume	Description:	Alternative G6 consists of pumping groundwater to remove mass from high concentration areas of the aquifer and to establish hydraulic control of the aquifer to minimize off-Site migration of the groundwater plume. Extracted groundwater will be treated via an air stripper prior to discharge to adjacent surface water. The air stream will be treated using vapor phase GAC.
Location:	Town of Hempstead, Village of Hewlett		
Phase:	Feasibility Study (-30% - +50%)		
Base Year:	2011		
Date:	April 26, 2011		

Item No.	Description	Quantity	Unit	Unit Cost	Total	Notes
O&M COST:						
Item No.	Description	Quantity	Unit	Unit Cost	Total	Notes
1	Operation					
1.1	Electrical Usage	500,000	KW-Hr	\$ 0.12	\$ 60,000	
1.2	Vapor Carbon Usage	48,000	Lb	\$ 1.20	\$ 57,600	Carbon regeneration.
1.3	Plant Operator	2,080	HR	\$ 100.00	\$ 208,000	Full time (40 hr/week; 52 weeks;yr).
1.4	Effluent Sampling - Air	24	EA	\$ 550	\$ 13,200	Monthly, VOCs
1.5	Reporting	12	Month	\$ 7,500	\$ 90,000	Monthly.
1.6	Effluent Sampling - Water	24	EA	\$ 550	\$ 13,200	Monthly, VOCs
1.7	Permitting and Disposal Fee for Discharging to POTW	1	yearly	\$ 8,500	\$ 8,500	Yearly includes disposal fee of \$1500 per year and \$7000 per year for permitting.
	Sub-Total				\$ 450,500	
	Project Management	10%			\$ 45,000	
	Technical Support	8%			\$ 36,000	
	Contingency	15%			\$ 68,000	5% scope + 10% bid.
					\$ 599,500	
2	Maintenance					
2.1	Repair/Replacement of Equipment	1	LS	\$ 60,000	\$ 60,000	
2.2	Well Repair and Maintenance	1	LS	\$ 10,000	\$ 10,000	
	Sub-Total				\$ 70,000	
	Project Management	10%			\$ 7,000	
	Technical Support	8%			\$ 6,000	
	Contingency	15%			\$ 11,000	5% scope + 10% bid.
					\$ 94,000	
3	LTM and Institutional Controls					
3.1	Maintain Institutional Controls	1	LS	\$ 12,000	\$ 12,000	
3.2	Groundwater Sampling	60	LS	\$ 950	\$ 57,000	Quarterly for 5 years; semi for years 0-30.
3.3	Groundwater Sample Laboratory Analysis	60	EA	\$ 550	\$ 33,000	Total VOCs analysis.
3.4	Data Reduction, Evaluation and Reporting	2	EA	\$ 25,000	\$ 50,000	2 reports per year.
	Sub-Total				\$ 152,000	
	Project Management	10%			\$ 15,000	
	Technical Support	8%			\$ 12,000	
	Contingency	15%			\$ 23,000	5% scope + 10% bid.
					\$ 202,000	
4	Performance Sampling					
4.1	Performance Sampling and Analysis	46	EA	\$ 1,500	\$ 69,000	23 performance wells, VOCs analysis only, semi-annually every year from 0-30.
4.2	Data Reduction, Evaluation, Reporting	2	LS	\$ 20,000	\$ 40,000	Two reports per year.
	Sub-Total				\$ 109,000	
	Project Management	10%			\$ 11,000	
	Technical Support	8%			\$ 9,000	
	Contingency	15%			\$ 16,000	5% scope + 10% bid.
					\$ 145,000	

Table 14
Cost Estimate for Alternative 4 - Groundwater Pump and Treat

Site:	Peninsula Boulevard Groundwater Plume	Description:	Alternative G6 consists of pumping groundwater to remove mass from high concentration areas of the aquifer and to establish hydraulic control of the aquifer to minimize off-Site migration of the groundwater plume. Extracted groundwater will be treated via an air stripper prior to discharge to adjacent surface water. The air stream will be treated using vapor phase GAC.
Location:	Town of Hempstead, Village of Hewlett		
Phase:	Feasibility Study (-30% - +50%)		
Base Year:	2011		
Date:	April 26, 2011		

Item No.	Description	Quantity	Unit	Unit Cost	Total	Notes
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PERIODIC COSTS:

Item No.	Description	Year	Quantity	Unit	Unit Cost	Total	Notes
1	Five Year Review						
1.1	Review and Report	5	1	LS	\$ 50,000	\$ 50,000	Every 5 years through year 30.
1.2	Update Institutional Controls	5	1	LS	\$ 25,000	\$ 25,000	Every 5 years through year 30.
	Sub-Total					\$ 75,000	
2	Treatment Plant						
2.1	Demobilize Treatment Plant	30	1	LS	\$ 50,000	\$ 50,000	
2.2	Well Abandonment	30	62	LS	\$ 1,500	\$ 93,000	
2.3	Injection Piping Removal	30	1	LS	\$ 50,000	\$ 50,000	
2.4	Permitting and Reporting	30	1	LS	\$ 25,000	\$ 25,000	
	Sub-Total					\$ 218,000	

PRESENT VALUE ANALYSIS:

Rate of Return: 7%

Interest Rate: 3%

Item No.	Cost Type	Year	Total Cost	Present Value	Notes
1	Capital Cost	0	\$ 2,996,950	\$ 2,996,950	
2	O & M Cost				
2.1	Performance Sampling		\$ 109,000	\$ -	
2.2	LTM/ICs		\$ 202,000	\$ -	
2.3	Operation		\$ 599,500	\$ -	
2.4	Maintenance		\$ 94,000	\$ -	
	Sub-Total			\$ 18,249,633	
3	Periodic Costs				
3.1	5 Year Review		\$ 75,000	\$ -	
3.2	System Decommissioning		\$ 218,000	\$ -	
	Sub-Total			\$ 312,945	
TOTAL PRESENT VALUE OF ALTERNATIVE				\$ 21,560,000	

**PENINSULA BOULEVARD GROUNDWATER PLUME
SUPERFUND SITE**

RECORD OF DECISION

APPENDIX III

ADMINISTRATIVE RECORD INDEX

**PENINSULA BOULEVARD GROUNDWATER PLUME
OPERABLE UNIT ONE
ADMINISTRATIVE RECORD FILE
INDEX OF DOCUMENTS**

3.0 REMEDIAL INVESTIGATION

3.2 Sampling and Analysis Data/Chain of Custody Forms

P. 300001 - Report: Data Evaluation Report for the Peninsula
300219 Boulevard Groundwater Plume RI/FS, Town of Hempstead,
Doc. ID# 109579 Village of Hewlett, Nassau County, New York,
Volume 1 of 2, prepared by Tetra Tech EC, Inc.,
prepared for U.S. EPA, Region 2, October 2008.

P. 300220 - Report: Data Evaluation Report for the Peninsula
301329 Boulevard Groundwater Plume RI/FS, Town of Hempstead,
Doc. ID# 109580 Village of Hewlett, Nassau County, New York,
Volume 2 of 2, prepared by Tetra Tech EC, Inc.,
prepared for U.S. EPA, Region 2, October 2008.

3.3 Work Plans

P. 301330 - Report: Final Remedial Investigation/Feasibility
301413 Study Work Plan, Peninsula Boulevard Groundwater
Doc. ID# 109581 Plume RI/FS, Town of Hempstead, Village of Hewlett,
Nassau County, New York, prepared by Tetra Tech FW,
Inc., prepared for U.S. EPA, Region 2, April 2005.

P. 301414 - Report: Appendices A and B to Work Plan for Remedial
301769 Investigation/Feasibility Study, Peninsula Boulevard
Doc. ID# 109582 Groundwater Plume RI/FS, Town of Hempstead, Village
of Hewlett, Nassau County, New York, prepared by
Tetra Tech FW, Inc., prepared for U.S. EPA, Region 2,
April 2005.

P. 301770 - Report: Remedial Investigation/Feasibility Study Work
302038 Plan, Peninsula Boulevard Groundwater Plume RI/FS,
Doc. ID# 109583 Town of Hempstead, Village of Hewlett, Nassau County,
New York, prepared by Mr. Michael Musso, P.E.,
Project Manager, HDR, prepared for U.S. EPA, Region
2, March 2010.

3.4 REMEDIAL INVESTIGATION REPORTS

P. 302039 - Report: Draft, Screening Level Ecological Risk
302108 Assessment (SLERA), United States Environmental
Protection Agency, Peninsula Boulevard Site, Town
of Hempstead, Village of Hewlett, Nassau County,
Doc. ID# 109584 New York, prepared by Amy Soli, Ph.D., HDR, prepared
for U.S. EPA, Region 2, December 2010.

8.0 HEALTH ASSESSMENT

8.1 ATSDR Health Assessments

P. 800001 - Report: Public Health Assessment for Peninsula
800051 Groundwater Plume, Town of Hempstead, Nassau County,
New York, EPA Facility ID: NYN000204407, prepared by
Doc. ID# 109585 New York State Department of Health, Center for
Environmental Health, Under Cooperative Agreement
with the U.S. Department of Health & Human Services,
Agency for Toxic Substances and Disease Registry,
Division of Health Assessment and Consultation,
Superfund and Program Assessment Branch, Atlanta,
Georgia, April 24, 2007.

**PENINSULA BOULEVARD GROUNDWATER PLUME
OPERABLE UNIT ONE
ADMINISTRATIVE RECORD FILE UPDATE
INDEX OF DOCUMENTS**

3.0 REMEDIAL INVESTIGATION

3.4 Remedial Investigation Reports

- P. 302109 - Report: Final Human Health Risk Assessment for
302220 Peninsula Boulevard Groundwater Plume Superfund
Site, Nassau County, New York, prepared by CH2MHILL,
Doc. ID# 111361 prepared for HDR, Inc., May 2011.
- P. 302221 - Report: Final Remedial Investigation Report,
308317 Peninsula Boulevard Groundwater Plume Superfund Site,
Village of Hewlett, Town of Hempstead, Nassau County,
New York, prepared by Mr. Michael P. Musso, PE,
Doc. ID# 111363 Project Manager, HDR, prepared for U.S. Environmental
Protection Agency, Region 2, July 2011.

4.0 FEASIBILITY STUDY

4.3 Feasibility Study Reports

- P. 400001 - Report: Final Feasibility Study Report, Peninsula
400140 Boulevard Groundwater Plume Superfund Site, Village
of Hewlett, Town of Hempstead, Nassau County, New
York, prepared by Mr. Michael P. Musso, PE, Project
Doc. ID# 111364 Manager, HDR, prepared for U.S. Environmental
Protection Agency, Region 2, July 2011.

PENINSULA BOULEVARD GROUNDWATER PLUME
OPERABLE UNIT ONE
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10.0 PUBLIC PARTICIPATION

10.9 Proposed Plan

P. 10.00001 - Report: Superfund Proposed Plan, Peninsula Boulevard
10.00019 Groundwater Contamination Superfund Site, Nassau
County, New York, prepared by U.S. Environmental
Doc. ID# 111875 Protection Agency, Region 2, July 22, 2011.

**PENINSULA BOULEVARD GROUNDWATER PLUME
SUPERFUND SITE**

RECORD OF DECISION

APPENDIX IV

STATE LETTER OF CONCURRENCE

New York State Department of Environmental Conservation

Division of Environmental Remediation

Office of the Director, 12th Floor

625 Broadway, Albany, New York 12233-7011

Phone: (518) 402-9076 • Fax: (518) 402-9020

Website: www.dec.ny.gov



Joe Martens
Commissioner

SENT VIA EMAIL ONLY

September 30, 2011

Mr. Walter Mugdan, Director (mugdan.walter@epa.gov)
United States Environmental Protection Agency
Emergency & Remedial Response Division
290 Broadway, Floor 19-No E-38
New York, New York 10007-1866

Re: Peninsula Boulevard Investigation Site, Site No. 130117
Groundwater Contamination Superfund NPL Site, Operable Unit 1 (OU1),
Nassau (C), Record of Decision (ROD)

Dear Mr. Mugdan:

The New York State Department of Environmental Conservation (Department) and the New York State Department of Health (NYSDOH) have reviewed the above referenced ROD. The State concurs with the selected remedy as stated in the draft final ROD of September 2011. This remedy includes extraction of the groundwater via pump and ex-situ treatment, in-situ chemical treatment of targeted high concentration contaminant areas, and monitored natural attenuation outside active remediation areas. The Department looks forward to getting the field work started as soon as possible for Operable Unit 2 (OU2), the Source Area Investigation, for this site.

If you have any questions, please contact John Swartwout, P.E. or Jim Harrington, P.E. at (518) 402-9625.

Sincerely,

Dale A. Desnoyers
Director
Division of Environmental Remediation

ec: J. LaPadula, USEPA (lapadula.john@epa.gov)
G. Sosa, USEPA (sosa.gloria@epa.gov)
S. Badalamenti, USEPA (badalamenti.salvatore@epa.gov)
K. Willis, USEPA (willis.kevin@epa.gov)
C. Bethoney, NYSDOH (cmb18@health.state.ny.us)
S. Karpinski, NYSDOH (sxk23@health.state.ny.us)
J. Defranco, NCDHS (Joseph.DeFranco@hhsnassaucountyny.us)
R. Schick
J. Swartwout
M. Sweet
W. Parish



500133

**PENINSULA BOULEVARD GROUNDWATER PLUME
SUPERFUND SITE**

RECORD OF DECISION

APPENDIX V

RESPONSIVENESS SUMMARY

SUMMARY OF DOCUMENTS

Section V-a: July 28, 2011 Proposed Plan

Section V-b: August 13, 2010 Public Notice

Section V-c: August 3, 2011 Public Meeting Sign-In Sheet

Section V-d: August 3, 2011 Public Meeting Transcript

Section V-e: Correspondence Received During the Comment Period

**RESPONSIVENESS SUMMARY
FOR THE
RECORD OF DECISION**

**PENINSULA BOULEVARD GROUNDWATER PLUME SUPERFUND SITE VILLAGE
OF HEWLETT, TOWN OF HEMPSTEAD, NASSAU COUNTY, NEW YORK**

INTRODUCTION

This Responsiveness Summary provides a summary of citizen's comments and concerns received during the public comment period related to the Peninsula Boulevard Groundwater Plume Superfund Site (Site) groundwater remedy Proposed Plan, and it provides the U.S. Environmental Protection Agency's (EPA's) responses to those comments and concerns. All comments summarized in this document have been considered in EPA's final decision in the selection of a groundwater remedy.

SUMMARY OF COMMUNITY RELATIONS ACTIVITIES

The 2011 RI/FS report and the Proposed Plan for the contaminated groundwater at the Site were released to the public for comment on July 28, 2011. These documents were made available to the public at information repositories maintained at the Hewlett Library in Hewlett, New York and the EPA Region II Office in New York City. The notice of availability for the above-referenced documents was published in the South Shore Herald on July 28, 2011. The public comment period ran from July 28, 2011 to August 27, 2011. On August 3, 2011, EPA conducted a public meeting at the Hewlett High School to inform local officials and interested citizens about the Superfund process, to present the Proposed Plan for the Site, including the preferred groundwater remedial alternative, and to respond to questions and comments from the approximately 15 attendees (see Appendix V-c for a copy of the sign-in sheet for the meeting). On the basis of comments received during the public comment period, the public generally supports the selected remedy.

SUMMARY OF COMMENTS AND RESPONSES

Comments were received at the public meeting and in writing via e-mail and letters. Written comments were received from:

- Joseph DeFranco, Nassau County Department of Health, August 11, 2011 letter.
- Jeffrey Solomon, Hewlett, NY, August 16, 2011 e-mail.
- Judith and Gary Baum, Hewlett, NY, August 15, 2011 e-mail.
- Denise Cohen-Kronfeld, DMD, Hewlett, NY, August 19, 2011 e-mail.
- Paolo Sapienza, Hewlett, NY, August 18, 2011 e-mail.
- Anthony Giordano, Hewlett, NY, August 21, 2011 e-mail.
- Ken Crystal, Hewlett, NY, August 25, 2011 e-mail.

The transcript from the public meeting can be found in Appendix V-d.

The written comments submitted during the public comment period can be found in Appendix V-e.

A summary of the comments provided at the public meeting and in writing, as well as EPA's responses to them, are provided below.

Comment #1: A representative of the Nassau County Department of Health stated in his comment letter that the primary source of drinking water for this area comes from the Long Island American Water Corporation's well field located at Starfire Court (LIAWC Well Field #5) which is located hydraulically downgradient and in close proximity to the Site. The comment letter also mentioned that this well field has approximately 75 active water supply wells that are screened between 20 – 160 feet below ground surface and that the pumping rate for the well field is approximately 8 million gallons per day. The NCDOH representative opined that this pumping rate most likely has an influence on the groundwater flow anomaly observed in the study area. The regional groundwater flow would be expected to be southwest and the observed flow direction at the site is northwest, towards the well field.

The Starfire Court well field also treats its water for volatile organic compounds (VOCs) prior to distribution. These VOCs are primarily, tetrachloroethene (PCE), trichloroethene (TCE) and 1, 2 dichloroethene (DCE), at concentrations generally below 10 parts per billion (ppb) in the raw water.

The comment letter stated that EPA mentioned in the public meeting that the public water supply comes from the Jameco aquifer and this aquifer is separated from the Upper Glacial aquifer (UGA) by a clay layer protecting it from site-related contamination. The NCDOH representative declares that statement is not completely accurate, nor is the assumption that site-related contamination is not affecting the LIAWC Well Field #5.

Response to Comment #1: As discussed in the Remedial Investigation (RI) and Record of Decision (ROD), the Jameco aquifer, despite its limited extent in this area of Long Island, is a water-bearing zone of primary importance, due to hydraulic conductivity values on the order of 200 feet per day. The LIAWC Well Field #5 adjacent to the Site utilizes the Jameco as its source aquifer. North of the Site, the UGA directly overlies the Jameco. Given the similar hydraulic properties of the UGA and Jameco, there is the potential for significant hydraulic connection between the two units, with data from a broader area of Long Island indicating that to be the case. However, data obtained during the RI indicate that the Gardiners Clay acts as a confining unit in the localized area of the Site and the LIAWC Well Field.

In October 2010, EPA collected a total of five groundwater samples from new production wells (re-drills) in the LIAWC Plant #5 Well Field. The following VOCs were

detected in the analysis of these samples: chloromethane, chloroform, MTBE, PCE, and toluene. No concentrations were detected exceeding groundwater criteria or drinking water standards.

Information obtained from LIAWC and the results of EPA sampling at new production wells on LIAWC Plant #5 property in October 2010 indicate that the Plant #5 Well Field has contamination similar to that found in the Site plume and therefore may have been impacted by the contamination from the Site.

During the pre-design phase, EPA intends to collect additional groundwater quality data from the Jameco aquifer. EPA will continue to coordinate and exchange information with the LIAWC.

Comment #2: Several commenters stated their support for the placement of the Peninsula Boulevard Groundwater Plume Superfund Site on the National Priorities List (NPL) and the cleanup of the groundwater contamination.

Response to Comment #2: The Site was included on the NPL on July 21, 2004. This decision document presents the selected remedy to address contaminated groundwater at the Site.

Comment #3: A commenter expressed concern about the Cedar Wood Cleaners located on West Broadway. They wanted to know if there is a study the EPA can perform to ensure that no groundwater or adjacent property owner is at risk from any carcinogenic contaminants being discharged by the cleaner.

Response to Comment #3: EPA is currently conducting an investigation (Remedial Investigation, Operable Unit 2) to identify the potential sources of groundwater contamination at the Site. As part of this investigation, EPA intends to collect environmental samples at several dry cleaners in the area. The results of this sampling will assist EPA in determining if operations or activities at these dry cleaners have contributed to the groundwater contamination at the Site.

Comments received during the public meeting:

Comment #4: Is there any contamination in the aquifer that Long Island American draws from its site just north (Well Field #5)?

Response to Comment #4: LIAWC operates its Well Field #5 on property located within approximately 1,000 feet of the northern boundary of the study area. Well Field #5 has been impacted by VOC contamination, including chlorinated VOCs, which have been detected at levels exceeding health-based criteria prior to treatment, as evidenced

by sampling dating back to the late 1970's (i.e., pre-treatment samples collected of blended raw water from the manifolded pumping wells). Since April 1991, the Plant #5 source water has been treated for PCE contamination via a packed tower aeration system (i.e., air strippers). This engineering control has been effective in reducing VOC levels in the raw water (pre-treatment) to comply with drinking water standards. PCE has been detected in quarterly raw water samples collected at the Plant #5 since 1979, at concentrations ranging from 0.5 to 34 micrograms per liter (ug/l). TCE and cis-1,2-DCE were also detected in some raw water samples. LIAWC has noted that the PCE concentrations observed in the Plant #5 raw water have generally been trending downward over time.

Comment #5: Did you find evidence that the plume is moving or expanding?

Response to Comment #5: The results of the environmental sampling performed during the RI indicate that the groundwater plume appears fairly stable and still exists in the same general area where it was originally delineated by EPA in 2007.

Comment #6: Does EPA have a sense of how much PCE would have to have been released, assuming it was all in one place, to create the kind of plume and the density that we see here?

Response to Comment #6: The amount of PCE released at the Site is unknown. However, It does not take a lot of PCE to contaminate an aquifer. For example, 1 ounce of PCE in 1 million ounces of water is 1 part per million (ppm). One ounce of PCE in 1 billion ounces of water is 1 part per billion (ppb). If one drop of PCE is mixed in a competition size swimming pool, the water will contain about 1 ppb of PCE. The drinking water standard for PCE is 5 ppb.

Comment #7: What were the results of the air contamination study, did you find contamination?

Response to Comment #7: Despite EPA efforts to obtain access to perform soil vapor intrusion sampling at residences at the Site, including mailings, telephone calls and in-person solicitations, EPA was only able to obtain permission to conduct vapor intrusion sampling at fifteen residences at the Site. The results of the analyses indicated that one residence had concentrations of VOCs at or above EPA Region 2 screening levels in the sub-slab and indoor air. As a result, EPA installed a sub-slab depressurization system at this residence to mitigate the impacts of soil vapor intrusion by reducing or eliminating vapor entry into the building. EPA intends to continue to investigate the soil vapor intrusion pathway at the Site.

Comment #8: At some point, you made the statement that there was no unacceptable risk – is that based on particular data?

Response Comment #8: EPA documents in the RI that there are no current unacceptable risks to human health at the Site. There are no complete routes of exposures from human receptors to the groundwater contamination because private wells are not utilized for drinking water in the area. Residences and businesses in the area are connected to the public water supply. The public-water supply does not have contamination above drinking-water standards.

Comment #9: Will EPA still be testing indoor air quality?

Response to Comment #9: EPA will continue to investigate the vapor intrusion pathway in buildings at the Site. If results of sampling indicate the presence of site-related vapors above protective levels, EPA will implement the appropriate measures.

Comment #10: What is our obligation as homeowners in terms of the disclosure for the Superfund site?

Response to Comment #10: New York State is a full disclosure state and it is the responsibility of a homeowner when selling a home to disclose known information with respect to the results of any environmental sampling that was performed.

Public Meeting Comment #11: Roughly, what is the timeline of the project from start to finish?

Response to Comment #11: The Remedial Design phase, which is anticipated to begin in 2011, is estimated to take approximately 1.5 years to complete. The construction time for the selected remedy will take approximately 9 to 12 months.

Comment #12: What will be the physical location of any holding tanks for the groundwater pump and treat remedial alternative (preferred remedy)?

Response to Comment #12: The exact physical location of a treatment facility or any utilities associated with the treatment plant will be determined by EPA during the remedial design phase.

Comment #13: As a member of the fire department, are there any concerns that we (the fire department) might have responding to a potential incident that may occur either at a holding tank or in a building where there may be vapor or a vapor build-up?

Response Comment #13: During each phase of the remedial process, EPA develops a comprehensive health and safety plan for the protection of the community as well as the on-site workers. As part of this effort, EPA will develop a health and safety plan for the remedial design, construction, and operation phases. EPA will coordinate with the local authorities to ensure that this plan is distributed to the fire department and any other local emergency agencies.

Comment #14: We are in a hurricane zone. What precautions will EPA take in case there is a hurricane and what damage might a hurricane do to EPA activities?

Response to Comment #14: During each phase of the remedial process, EPA develops the appropriate plans to ensure that site-related activities are conducted in a manner that are protective of human health and the environment. These site-specific plans include a description of the necessary precautions that should be taken in the event of severe weather, such as a hurricane.

RESPONSIVENESS SUMMARY

APPENDIX V-a

AUGUST 2010 PROPOSED PLAN

Peninsula Boulevard Groundwater Contamination Superfund site Nassau County, New York

July 2011

EPA ANNOUNCES PROPOSED PLAN

This Proposed Plan describes the remedial alternatives considered for the contaminated groundwater at the Peninsula Boulevard Groundwater Contamination Superfund site and identifies the preferred remedy with the rationale for this preference. This Proposed Plan was developed by the U.S. Environmental Protection Agency (EPA) in consultation with the New York State Department of Environmental Conservation (NYSDEC). EPA is issuing this Proposed Plan as part of its public participation responsibilities under Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended, and Sections 300.430(f) and 300.435(c) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The nature and extent of the contamination at the site and the remedial alternatives summarized in this Proposed Plan are described in the June 2011 Remedial Investigation (RI) Report and Feasibility Study (FS) Report, respectively. EPA and NYSDEC encourage the public to review these documents to gain a more comprehensive understanding of the site and the Superfund activities that have been conducted.

This Proposed Plan is being provided as a supplement to the above-noted documents to inform the public of EPA and NYSDEC's preferred remedy and to solicit public comments pertaining to all of the remedial alternatives evaluated, including the preferred alternative. EPA and NYSDEC's preferred alternative involves the extraction and on-site treatment of contaminated groundwater. The treated groundwater effluent would be disposed by discharge to a waste-water treatment plant, surface water or reinjection to groundwater.

The remedy described in this Proposed Plan is the preferred remedy for the site. Changes to the preferred alternative or a change from the preferred alternative to another alternative may be made if public comments or additional data indicate that such a change will result in a more appropriate remedial action. The final decision regarding the selected remedy will be made after EPA has taken into consideration all public comments. EPA is soliciting public comment on all of the alternatives considered in the Proposed Plan and in the detailed

analysis section of the FS report, since EPA and NYSDEC may select a remedy other than the preferred alternative.

MARK YOUR CALENDAR

PUBLIC COMMENT PERIOD:

July 28, 2011 – August 27, 2011

EPA will accept written comments on the Proposed Plan during the public comment period.

PUBLIC MEETING: August 3, 2011 at 7:00 pm

EPA will hold a public meeting to explain the Proposed Plan and all of the alternatives presented in the Feasibility Study. Oral and written comments will also be accepted at the meeting. The meeting will be held at the Village of Hewlett High School, 60 Everit Avenue, Hewlett, NY.

COMMUNITY ROLE IN SELECTION PROCESS

EPA and NYSDEC rely on public input to ensure that the concerns of the community are considered in selecting an effective remedy for each Superfund site. To this end, the RI and FS reports and this Proposed Plan have been made available to the public for a public comment period which begins on July 28, 2011 and concludes on August 27, 2011.

A public meeting will be held during the public comment period at the Hewlett High School on August 3, 2011 at 7:00 p.m. to present the conclusions of the RI/FS, to elaborate further on the reasons for recommending the preferred alternative, and to receive public comments.

INFORMATION REPOSITORIES

Copies of the Proposed Plan and supporting documentation are available at the following information repositories:

Hewlett-Woodmere Public Library
1125 Broadway
Hewlett, New York 11557-0903
Telephone: (516) 374-1967
Hours of operation:
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Comments received at the public meeting, as well as written comments, will be documented in the Responsiveness Summary Section of the Record of Decision (ROD), the document which formalizes the selection of the remedy.

Written comments on the Proposed Plan should be addressed to:

Gloria M. Sosa
Remedial Project Manager
Western New York Remediation Section
U.S. Environmental Protection Agency
290 Broadway, 20th Floor
New York, New York 10007-1866
telephone: (212) 637-4283
fax: (212) 637-3966
e-mail: sosa.gloria@epa.gov

SCOPE AND ROLE OF ACTION

The primary objectives of this action are to remediate the groundwater contamination, to minimize the migration of contaminants, and to minimize any potential future health and environmental impacts. This Proposed Plan addresses groundwater contamination, designated Operable Unit 1 (OU 1) at the site. EPA is currently conducting an RI to identify and delineate the potential source(s) of the tetrachloroethylene (PCE) contamination, designated Operable Unit 2 (OU 2). A final remedy to address the source contamination will be presented in a future Proposed Plan and Record of Decision.

SITE BACKGROUND

Site Description

The Peninsula Boulevard Groundwater Plume Superfund Site (the Site) consists of the area within and around a groundwater plume located in the Village of Hewlett, Town of Hempstead, Nassau County, New York. John F. Kennedy International Airport is located approximately three miles to the west of the Site. A Site location map is provided as Figure 1.

The area consists of a mix of commercial and residential properties, with the majority of the commercial properties being located along Mill Road, Peninsula Boulevard, Broadway, and West Broadway. Woodmere Middle School is located along the western site boundary. Portions of Motts Creek, Doxey Brook Drain, and an unnamed tributary leading to Motts Creek are located within the Site.

The residences in the area of the Site are serviced by the Long Island American Water Company (LIAWC). The

LIAWC operates a well field approximately 1000 feet north of the Site. The water delivered to these residents is a blend of water from several well fields. Since 1991, LIAWC has been treating groundwater pumped from this well field with an air stripper prior to distribution. Based on a records review of water supply wells in the area, private wells are not utilized for drinking water in the area.

Site History

A series of investigations and removal actions from 1991 to 1999 on behalf of the owner of the former Grove Cleaners and the NYSDEC revealed an extensive groundwater contaminant plume extending both to the north and south of Peninsula Boulevard, primarily consisting of the chlorinated volatile organic compound (CVOC) PCE.

The investigation revealed that operations at the former Grove Cleaners, located at 1274 Peninsula Boulevard, from 1987 to 1992 resulted in the disposal of hazardous wastes, including the volatile organic compounds (VOCs) PCE and trichloroethylene (TCE) to the environment. In March 1991, the Nassau County Department of Health (NCDH) cited Grove Cleaners for discharging hazardous waste into on-site dry wells. PCE was detected in soil and sludge samples collected at the Grove Cleaners site, and in other media at and near the property. The results of the investigation suggested the potential for additional source areas other than the former Grove Cleaners site. Following the implementation of interim remedial measures, which consisted of the removal of impacted soils related to solvent discharge to a dry well, a No Further Action remedy was selected by NYSDEC in March 2003 for the former Grove Cleaners site.

On March 7, 2004, EPA proposed inclusion of the Site on the National Priorities List (NPL) and on July 22, 2004, EPA placed the Site on the NPL.

EPA conducted an RI at the Site from 2005 through 2010. Environmental sampling of groundwater, surface water, soil and sediment was performed and a Data Evaluation Report (DER) presenting the results of the environmental sampling was prepared in October 2008. Supplemental RI work was conducted at the Site in 2010 to address data gaps including hydrogeological sampling and analyses, and to develop a baseline human health risk assessment (HHRA) and screening-level ecological risk assessment (SLERA). A DER Addendum was issued in December 2010 presenting the results of this sampling. A RI Report was released in June 2011.

The RI identified groundwater contaminated with PCE, PCE breakdown products and low levels of other VOCs.

The source of the PCE groundwater contamination has not yet been identified.

Site Hydrogeology

The Upper Glacial Aquifer (UGA) underlies the Site. Groundwater flow in the UGA is dominated by a groundwater divide located approximately 2000 feet south of Peninsula Boulevard, along a low ridge trending southwest to northeast. North of the divide, groundwater flow is both north and west, depending upon depth. South of the divide, groundwater flow within the UGA southward toward Macy Channel.

North of the Site, the UGA overlies the Jameco Aquifer. In this area of Long Island, the Jameco Aquifer is limited in extent, but is an important water-bearing zone because of its high hydraulic conductivity on the order of 200 feet per day. The LIAWC Plant #5 Well Field adjacent to the Site utilizes the Jameco as its source aquifer and does not utilize the UGA for water production. Given the similar hydraulic properties of the UGA and Jameco, there is the potential for significant hydraulic connection between the two units. However, data obtained as a result of the supplemental RI activities indicate that the Gardiners Clay acts as a confining unit in the localized area of the Site and the LIAWC well field.

The inter-bedded nature of sediments in the UGA suggests significant vertical and horizontal variability in hydraulic conductivity values. The “20-foot clay” is a discontinuous, semi-confining layer which separates the UGA into an upper and lower zone in some areas of the Site.

The depth to groundwater within the unconfined portion of the UGA ranges from approximately 3 to 15 feet below ground surface (bgs), while ranging from 6 to 17 feet bgs in the semi-confined portion of aquifer. Saturated thickness of the unconfined UGA above the “20-foot clay” layer ranges from 10 to 30 feet. Saturated thickness of the deeper portion of the UGA below the “20-foot clay”, including the pressure head component caused by the semi-confined conditions, is approximately 55 to 65 feet.

RESULTS OF THE REMEDIAL INVESTIGATION

The results of the RI indicate that the shallow and deep portions of the UGA have been impacted by CVOC contamination. The shallow UGA groundwater (0 to 30 feet bgs) PCE plume is approximately 3,500 feet long, oriented in a north-south direction. South of Peninsula Boulevard (upgradient), the plume is approximately 1,000 feet wide and north of Peninsula Boulevard

(downgradient) the plume is approximately 400 feet wide. (See Figures 2 & 3)

The deep UGA (40 to 75 feet bgs) groundwater plume is approximately 1,110 feet long, oriented in a northeast-southwest direction.

Groundwater

EPA conducted a Membrane Interface Probe (MIP) investigation and Hydropunch[®] sampling at the Site in 2006 and 2007. A total of 160 groundwater samples were collected from 61 locations. The results of this effort assisted EPA in selecting locations for the installation of groundwater-monitoring wells. Twenty-six monitoring wells were installed at the Site and several rounds of sampling were conducted in 2007, 2008, 2010, and 2011. Analytical results for these samples were compared to the EPA and New York State Department of Health (NYSDOH) promulgated health-based protective Maximum Contaminant Levels (MCLs), which are enforceable standards for various drinking water contaminants.

Groundwater contamination exceeding applicable drinking water standards has been shown to exist within the Site plume area, at highly elevated concentrations in some areas. Chlorinated VOCs, PCE in particular, were identified as the plume-related contaminants of concern for the shallow and deep portions of the UGA at the Site. Seven VOCs were detected at concentrations exceeding applicable criteria. Specifically, PCE was detected at levels up to 30,000 micrograms per liter (µg/l) and TCE, at concentrations up to 10,000 µg/l.

The RI groundwater data indicate that the Site contaminant plume in the deep portion of the UGA, dominated by PCE, appears stable and centered in the south-central portion of the Site.

Information obtained from LIAWC and the results of EPA sampling at new production wells on LIAWC Plant #5 property in October 2010 indicate that the Plant #5 Well Field has contamination similar to that found in the Site plume and, therefore, may have been impacted by the contamination from the Site.

An engineering control (air stripper) is maintained at the Plant #5 Well Field by LIAWC. The treated groundwater is tested and monitored by LIAWC in accordance with New York State and Nassau County rules and regulations. No MCL exceedances of chlorinated VOCs in water distributed to the general public have been identified during the RI.

The results of the RI indicate that the potential for natural attenuation of chlorinated compounds varies across the Site. PCE daughter products were not consistently detected in the same groundwater wells as PCE. Given site-specific conditions, natural attenuation of CVOCs does not appear to be a dominant process in the subsurface.

Surface Water, Soils and Sediments

The RI included sampling of soil at depths of 0-10 feet bgs. Surface soil (0-2 ft bgs) samples were collected at locations along the long axis (N-S) of the plume and in areas of elevated exposure potential. Subsurface soil sample locations were co-located with the Membrane-Interface Probe (MIP) and Hydropunch® groundwater sampling locations.

Surface water and sediment samples were collected from the Doxey Brook Drain, Motts Creek and the unnamed waterway. There were no exceedances of applicable criteria for plume-related compounds in surface water or sediment samples. No VOCs were detected in surface soil and no plume-related VOCs exceeded screening criteria in subsurface soil.

Vapor Intrusion

EPA is investigating the soil vapor intrusion pathway at the Site. VOC vapors released from contaminated groundwater and/or soil have the potential to move through the soil and seep through cracks in basements, foundations, sewer lines and other openings.

EPA conducted vapor intrusion sampling at fifteen residences at the Site. EPA drilled through the sub-slabs in the basements and installed ports in order to sample the soil vapor under these residences. Sampling devices called Summa canisters were attached to these ports to collect air at a slow flow rate over a twenty-four hour period. Summa canisters were also placed outside several residences to determine if there were any outdoor sources that may impact indoor air. The Summa canisters were then collected and sent to a laboratory for analyses.

The results of the analyses indicated that one residence had concentrations of VOCs at or above EPA Region 2 screening levels in sub slab and indoor air. EPA installed a sub-slab depressurization system at this residence in 2009 to mitigate the impacts of soil vapor intrusion by reducing or eliminating vapor entry into the building. EPA sampled indoor air in this residence in 2010 and VOCs were not detected in indoor air.

In addition to sampling residences for soil vapor intrusion, EPA sampled the North Woodmere Middle School in 2004 using a mobile laboratory to analyze the results. PCE was not detected in the basement, the area through which vapors would enter the building if there were vapor intrusion impact from the groundwater plume (there is no slab in the basement, but a dirt floor). No PCE was detected in the classrooms or the auditorium. PCE was detected in trace levels in the art room and in the drains in a bathroom (possibly from art supplies and personal hygiene products such as hair gel). The trace levels detected (0.15 - 0.35 parts per billion or ppb) do not pose any health concern.

EPA will continue to investigate the soil vapor intrusion pathway at the Site.

Source Investigation

The source of the PCE contamination was not identified during the OU 1 RI. Groundwater-plume characteristics (areal extent and relative concentrations) appear to indicate a potential source area at in the area along West Broadway. The wider width of the plume south of Peninsula Boulevard may be the result of comingling of contaminant plumes from additional upgradient source areas, radial groundwater flow induced from pumping, or the flat groundwater surface. EPA is currently conducting an OU 2 RI in order to delineate the source(s) of the groundwater contamination.

RISK SUMMARY

As part of the RI, EPA conducted a baseline risk assessment to estimate the current and future effects of contaminants on human health and the environment. A baseline risk assessment is an analysis of the potential adverse human health and ecological effects of releases of hazardous substances from a site in the absence of any actions or controls to mitigate such releases, under current and future land, groundwater, surface water and sediment uses. The baseline risk assessment includes a Human-Health Risk Assessment (HHRA) and an ecological risk assessment.

The cancer risk and non-cancer health hazard estimates in the HHRA are based on current reasonable maximum exposure scenarios and were developed by taking into account various health protective estimates about the frequency and duration of an individual's exposure to chemicals selected as chemicals of potential concern (COPCs), as well as the toxicity of these contaminants. Cancer risks and non-cancer health hazard indexes (HIs) are summarized below (please see the text box on page 6 for an explanation of these terms).

The Site is currently a residential neighborhood, with some nearby properties designated as mixed commercial. Future land use is expected to remain the same. The baseline risk assessment began by selecting COPCs in the various media that would be representative of Site risks. The media evaluated as part of the human health risk assessment included soil (0-10 feet), groundwater, and surface water and sediment from the Doxy Brook Drain, Motts Creek and the unnamed waterway. Groundwater at the Site is designated by NYSDEC as a potable water supply. The chemicals of concern (COCs) for the Site are cis-1,2-dichloroethylene (cis-1,2-DCE), PCE, TCE, and vinyl chloride (VC) for groundwater pathways.

The baseline risk assessment evaluated health effects that could result from exposure to contaminated media through use of groundwater for potable purposes (including inhalation of vapors in the bathroom after showering), direct exposure to groundwater in an excavation trench, wading in Site waterways, direct contact exposure to surface (0-2 feet) and subsurface soil (2-10 feet), and inhalation of vapors from surface soils. Based on the current zoning and anticipated future use, the risk assessment focused on a variety of possible receptors, including current and future recreational users, future residents, future commercial workers and future construction workers. However, consistent with the anticipated future use of the Site, the receptors most likely to be in contact with media impacted by site-related contamination [e.g., groundwater] were primarily considered when weighing possible remedies for the Site.

These include the future residents, future commercial workers and future construction workers. A complete discussion of the exposure pathways and estimates of risk can be found in the *Human Health Risk Assessment* for the Site in the information repository.

A screening-level ecological risk assessment (SLERA) was conducted to evaluate the potential for ecological effects from exposure to surface soil, surface water and sediment. Surface soil, surface water, and sediment concentrations were compared to ecological screening values as an indicator of the potential for adverse effects to ecological receptors. A complete summary of the methodology utilized can be found in the *Screening Level Ecological Risk Assessment* for the Site in the information repository.

The results of the RI indicated that sediments and soils were not contaminated with site-related contaminants; therefore, no risks were calculated for exposure to Site sediments or soils. Exposure to surface waters did not pose an unacceptable cancer risk or non-cancer hazard.

EPA is currently conducting an ongoing investigation of vapor intrusion into structures within the area that could be potentially affected by the groundwater contamination plume. To date, one home has received a sub-slab depressurization system to mitigate vapors entering the home. If results of current or future sampling of other homes indicate the presence of site-related vapors above protective levels, EPA would expect to implement similar measures.

Human Health Risk Assessment

EPA's statistical analysis of ground water sampling data found that the average exposure concentration of cis-1,2-DCE, PCE, TCE, and VC in the groundwater were 710 µg/l, 11,000 µg/l, 920 µg/l, and 59 µg/l, respectively. All are in excess of EPA's Safe Drinking Water Act MCLs of 70 µg/l, 5 µg/l, 5µg/l, and 2 µg/l, respectively; these concentrations also exceed the NYSDOH MCLs, which are 5 µg/l for cis-1,2-DCE, PCE, and TCE, and 2 µg/l for VC. These concentrations are associated with an excess lifetime cancer risk 2×10^{-1} for the future adult and child resident and 2×10^{-2} for the future commercial worker. The calculated non-carcinogenic hazard quotients (HQs) are: future adult resident HQ=300, future child resident HQ=600 and future commercial worker HQ=50.

These cancer risks and non-cancer health hazards indicate that there is significant potential risk to potentially exposed populations from direct exposure to groundwater or and groundwater vapors. For these receptors, exposure to groundwater results in either an excess lifetime cancer risk that exceeds EPA's target risk range of 10^{-4} to 10^{-6} or an HI above the acceptable level of 1, or both. The chemicals in groundwater that contribute most significantly to the cancer risk and non-cancer hazard are cis-1,2-DCE, PCE, TCE, and VC.

Ecological Risk Assessment

The SLERA focused on potential exposure to plume-related contaminants (i.e., CVOCs). The CVOCs identified in the surface water, interstitial water and/or sediments include cis-DCE; methylene chloride; PCE; TCE, and VC. While other contaminants were detected in environmental samples, these other compounds and their concentrations may be indicative of the urbanized nature of the area and are not considered site-specific contaminants.

The ecologic receptors evaluated in the risk assessment included benthic macroinvertebrates in the aquatic environment and birds and small mammals in the terrestrial environment. Birds that were observed using the Site included mallard duck, American robin, red-winged blackbird, common grackle, double-crested

WHAT IS RISK AND HOW IS IT CALCULATED?

Human Health Risk Assessment: A Superfund baseline human health risk assessment is an analysis of the potential adverse health effects caused by hazardous substance releases from a site in the absence of any actions to control or mitigate these under current- and future-land uses. A four-step process is utilized for assessing site-related human health risks for reasonable maximum exposure scenarios.

Hazard Identification: In this step, the chemicals of potential concern (COPCs) at the site in various media (*i.e.*, soil, groundwater, surface water, and air) are identified based on such factors as toxicity, frequency of occurrence, and fate and transport of the contaminants in the environment, concentrations of the contaminants in specific media, mobility, persistence, and bioaccumulation.

Exposure Assessment: In this step, the different exposure pathways through which people might be exposed to the contaminants in air, water, soil, etc. identified in the previous step are evaluated. Examples of exposure pathways include incidental ingestion of and dermal contact with contaminated soil and ingestion of and dermal contact with contaminated groundwater. Factors relating to the exposure assessment include, but are not limited to, the concentrations in specific media that people might be exposed to and the frequency and duration of that exposure. Using these factors, a "reasonable maximum exposure" scenario, which portrays the highest level of human exposure that could reasonably be expected to occur, is calculated.

Toxicity Assessment: In this step, the types of adverse health effects associated with chemical exposures, and the relationship between magnitude of exposure and severity of adverse effects are determined. Potential health effects are chemical-specific and may include the risk of developing cancer over a lifetime or other non-cancer health hazards, such as changes in the normal functions of organs within the body (*e.g.*, changes in the effectiveness of the immune system). Some chemicals are capable of causing both cancer and non-cancer health hazards.

Risk Characterization: This step summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative assessment of site risks for all COPCs. Exposures are evaluated based on the potential risk of developing cancer and the potential for non-cancer health hazards. The likelihood of an individual developing cancer is expressed as a probability. For example, a 10^{-4} cancer risk means a "one-in-ten-thousand excess cancer risk"; or one additional cancer may be seen in a population of 10,000 people as a result of exposure to site contaminants under the conditions identified in the Exposure Assessment. Current Superfund regulations for exposures identify the range for determining whether remedial action is necessary as an individual excess lifetime cancer risk of 10^{-4} to 10^{-6} , corresponding to a one-in-ten-thousand to a one-in-a-million excess cancer risk. For non-cancer health effects, a "hazard index" (HI) is calculated. The key concept for a non-cancer HI is that a "threshold" (measured as an HI of less than or equal to 1) exists below which non-cancer health hazards are not expected to occur. The goal of protection is 10^{-6} for cancer risk and an HI of 1 for a non-cancer health hazard. Chemicals that exceed a 10^{-4} cancer risk or an HI of 1 are typically those that will require remedial action at the site and are referred to as Chemicals of Concern or COCs in the final remedial decision or Record of Decision.

cormorant, blue jay, mourning dove, white-throated sparrow, green-winged teal, black-capped chickadee, tufted titmouse, northern flicker, song sparrow, Canada goose, northern cardinal, house sparrow, house finch, European starling, and killdeer. Mammals that were observed included Norway rat, raccoon and gray squirrel. Potential risks were not quantified for each observed species, however, the risk for each category of species was estimated using a receptor species (*e.g.*, raccoon) or species groups (*e.g.*, benthic macroinvertebrates) as surrogates to represent the various components of the ecological community.

The ecological receptors were assumed to be exposed to CVOCs in surface waters, interstitial waters and sediments. However, it was assumed that the ecological receptors would not be exposed directly to groundwater resources. Additionally, it should be noted that VOCs were not detected in surface soil samples. Therefore, it is assumed that there was no contamination of these soils from the groundwater plume by the contaminants of concern.

The SLERA analyses included the comparison of the maximum concentrations of the contaminants of potential concern with the most appropriate, conservative ecological screening values that were identified for these compounds for each of the media of interest. The comparison of the maximum concentrations of each contaminant detected in the surface water, interstitial water, sediment, and surface soil with the ecological screening value(s) for each media medium did not reveal any contaminants in excess of these screening values. Additionally, none of the contaminants of interest are known to bioconcentrate, biomagnify, or bioaccumulate.

Based on the results of the SLERA, concentrations of contaminants detected in surface water, interstitial water, sediment and surface soil at the Site are unlikely to pose any unacceptable risks to aquatic or terrestrial ecological receptors at the Site.

Summary of Human Health and Ecological Risks

The results of the human health risk assessment indicate that the contaminated groundwater presents an unacceptable exposure risk. The screening-level ecological risk assessment indicated that the Site does not pose any unacceptable risks to aquatic or terrestrial ecological receptors.

Based upon the results of the RI and the risk assessment, EPA has determined that actual or threatened releases of hazardous substances from the Site, if not addressed by the preferred remedy or one of the other active measures considered, may present a current or potential threat to

human health and the environment. It is the EPA’s current judgment that the Preferred Alternative identified in the Proposed Plan is necessary to protect public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

REMEDIAL ACTION OBJECTIVES

Remedial action objectives (RAOs) are specific goals to protect human health and the environment. These objectives are based on available information and standards, such as applicable or relevant and appropriate requirements (ARARs), to-be-considered guidance, and site-specific risk-based levels.

The following remedial action objectives for contaminated groundwater (OU 1) will address the human health risks and environmental concerns:

- Restore the impacted aquifer to beneficial use as a source of drinking water by reducing contaminant levels to the federal and State MCLs; and,
- Reduce or eliminate the potential for migration of contaminants towards the LIAWC.

The following remedial action objective for soil vapor will address the human health risks and environmental concerns:

- Address existing or potential future exposure through inhalation of vapors migrating from contaminated groundwater into buildings at the Site.

SUMMARY OF REMEDIAL ALTERNATIVES

CERCLA §121(b)(1), 42 U.S.C. §9621(b)(1), mandates that remedial actions must be protective of human health and the environment, cost-effective, comply with ARARS, and utilize permanent solutions and alternative treatment technologies and resource recovery alternatives to the maximum extent practicable. Section 121(b)(1) also establishes a preference for remedial actions which employ, as a principal element, treatment to permanently and significantly reduce the volume, toxicity, or mobility of the hazardous substances, pollutants and contaminants at a site. CERCLA §121(d), 42 U.S.C. §9621(d), further specifies that a remedial action must attain a level or standard of control of the hazardous substances, pollutants, and contaminants, which at least attains ARARs under federal and state laws, unless a waiver can be justified pursuant to CERCLA §121(d)(4), 42 U.S.C. §9621(d)(4).

Detailed descriptions of the remedial alternatives for addressing the contamination associated with the Site can be found in the FS report. The FS report presents four groundwater alternatives, including a no action alternative. Based on the screening analyses and evaluations performed in the initial stages of the FS, remedial alternatives G3 and G5 were screened out of the final alternatives which are discussed below.

The construction time for each alternative reflects only the time required to construct or implement the remedy and does not include the time required to design the remedy, negotiate the performance of the remedy with any potentially responsible parties, or procure contracts for design and construction.

Common Elements

All of the alternatives, with the exception of the no action alternative, include monitored natural attenuation (MNA)/ long-term monitoring to address areas of the plumes outside of the active remediation areas, and institutional controls for groundwater use restrictions. Monitored natural attenuation is a variety of in-situ processes which, under favorable conditions, act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in groundwater.

Alternative 1: No Action

The National Oil and Hazardous Substance Pollution Contingency Plan (NCP) requires that a “No Action” alternative be developed as a baseline for comparing other remedial alternatives. Under this alternative, there would be no remedial actions conducted at the Site to control or remove groundwater contaminants. This alternative does not include monitoring or institutional controls.

Because this alternative would result in contaminants remaining above levels that allow for unrestricted use and unlimited exposure, CERCLA requires that the Site be reviewed at least once every five years. If justified by the review, additional response actions may be implemented.

<i>Capital Cost:</i>	\$0
<i>Annual O&M Costs:</i>	\$0
<i>Present-Worth Cost:</i>	\$0
<i>Construction Time:</i>	Not Applicable

Alternative G2: Enhanced Bioremediation

<i>Capital Cost:</i>	\$4,344,000
<i>Annual O&M Costs:</i>	\$835,000
<i>Present-Worth Cost:</i>	\$15,830,000
<i>Construction Time:</i>	9 – 12 months

This remedial alternative consists of implementing enhanced bioremediation in the plume area. Enhanced bioremediation is the process of destruction of contaminants by microorganisms in contaminated soil and water. Microorganisms consume organic substances for nutrients and energy. Enhanced bioremediation involves creating the proper conditions by injecting microorganisms or nutrients to the subsurface to accelerate the biodegradation of the CVOC contamination. The end products include carbon dioxide, water and microbial cell mass. Monitoring of biogeochemical parameters is used to monitor the effectiveness of remediation.

Enhanced bioremediation can be implemented in different system configurations. For the purposes of developing a conceptual design and cost estimate for comparison with other technologies in the FS, a transect configuration was evaluated. This conceptual design would require the installation of approximately 146 permanent injection wells to remediate contamination in the shallow UGA plume and 78 permanent injection wells to remediate contamination in the deeper UGA. This conceptual design would require further evaluation during the remedial design if chosen to be implemented. Additional wells would have to be installed to monitor the progress of the remediation. This alternative is expected to remove the contaminant mass within eight to 16 years in the shallow UGA plume remediation area and within 25 to 50 years in the deep UGA plume remediation area.

Alternative G4: In-Well Air Stripping

<i>Capital Cost:</i>	\$7,730,000
<i>Annual O&M Costs:</i>	\$730,000
<i>Present-Worth Cost:</i>	\$16,710,000
<i>Construction Time:</i>	9 – 12 months

This remedial alternative includes the installation of in-well air stripping systems over the plume area. In-well air stripping is a physical treatment technology whereby air is injected into a vertical well that is installed and screened at two depths in the groundwater. Pressurized air is injected into the well below the water table, aerating the water. The aerated water rises in the well and flows out of the system at the upper screen, inducing localized movement of groundwater into (and up) the well as contaminated groundwater is drawn into the system at the lower screen. VOCs vaporize within the well at the top of the water table, where the air bubbles out of water. The contaminated vapors accumulating in the wells are collected via vapor extraction contained within the well. Typically, extracted vapors are treated (if necessary) above grade and discharged to the

atmosphere. Vapor treatment, if required, generally consists of vapor-phase granular activated carbon (GAC).

The partially treated groundwater is never brought to the surface; it is forced into the unsaturated zone, and the process is repeated as water follows a hydraulic circulation pattern that allows continuous cycling of groundwater. As groundwater circulates through the treatment system in-situ, and vapor is extracted, contaminant concentrations are reduced.

In-well air stripping can be implemented in different system configurations. For the purposes of developing a conceptual design and cost estimate for comparison with other technologies in the FS, a grid configuration was evaluated. This conceptual design would require the installation of approximately 80 permanent air stripping wells to remediate contamination in the shallow UGA plume and 30 permanent air stripping wells to remediate contamination in the deeper UGA. This conceptual design would require further evaluation during the remedial design if chosen to be implemented. Additional wells would have to be installed to monitor the progress of the remediation. This alternative is expected to remove the contaminant mass within five to 10 years in the shallow UGA plume remediation area and within 10 to 20 years in the deep UGA plume remediation area.

Alternative G6: Groundwater Pump and Treat

<i>Capital Cost:</i>	\$2,997,000
<i>Annual O&M Costs:</i>	\$1,185,000
<i>Present-Worth Cost:</i>	\$21,560,000
<i>Construction Time:</i>	6 – 9 months

This remedial alternative consists of the extraction of groundwater via pumping wells and treatment prior to disposal. Groundwater is pumped to remove contaminant mass from areas of the aquifer with elevated PCE concentrations. Pumping from downgradient wells will provide hydraulic control of the contaminated groundwater with lower PCE concentrations. For this conceptual design, it is estimated that nine groundwater extraction wells would be installed in the shallow and deep UGA. A treatment plant with the capacity of approximately 350 (gallons per minute) gpm would be constructed within or nearby the Site to achieve the mass removal and hydraulic control objectives. Extracted groundwater with VOC contamination is typically treated with either liquid phase GAC or air stripping, or both. Air stripper effluent air stream may be treated with vapor phase GAC, if necessary. During the remedial design, a determination will be made whether to discharge treated extracted groundwater to a publically owned treatment works (POTW), surface water or reinjection to groundwater.

In-situ chemical treatment would be utilized to enhance the groundwater pump and treat remedy, as appropriate. During the remedial design, a treatability study would be performed to evaluate the use of in-situ chemical treatment, either in-situ chemical oxidation (ISCO) or in-situ chemical reduction (ISCR). The results of the study would be used to design the in-situ chemical treatment component of this alternative in a manner that complements and improves the effectiveness of the groundwater extraction and treatment component.

ISCO is a process that involves the injection of reactive chemical oxidants (such as Peroxide, Fenton's Reagent, Permanganate) into the subsurface for rapid contaminant destruction. Oxidation of organic compounds using ISCO is rapid and exothermic and results in the reduction of contaminants to primarily carbon dioxide and oxygen. ISCR uses chemical reductants such as zero-valent iron (ZVI). The ZVI donates electrons, acting as the reductant in a reaction that removes chlorine atoms from chlorinated hydrocarbon contaminants such as PCE.

In-situ chemical treatments, such as ISCO and ISCR were evaluated in the initial stages of the FS, but were screened out of the final alternatives as stand-alone remedies, because of the difficulty in implementation in a residential neighborhood, specifically obtaining access to residential properties. However, the use of in-situ chemical treatments targeting areas containing high concentrations of PCE that may reside outside the radius of influence of the pump within the inferred plume, as appropriate, in combination with groundwater extraction could potentially reduce the remediation time frames and the costs of this alternative.

EVALUATION OF ALTERNATIVES

During the detailed evaluation of remedial alternatives, each alternative is assessed against nine evaluation criteria, namely, overall protection of human health and the environment, compliance with applicable or relevant and appropriate requirements, long-term effectiveness and permanence, reduction of toxicity, mobility, or volume through treatment, short-term effectiveness, implementability, cost, and state and community acceptance. Refer to the table on the next page for a description of the evaluation criteria.

This section of the Proposed Plan profiles the relative performance of each alternative against the nine criteria, noting how each compares to the other options under consideration. A detailed analysis of alternatives can be found in the FS Report.

Overall Protection of Human Health and the Environment

All of the alternatives except Alternative G1 (No Action) would provide protection of human health and the environment. Alternatives G2, G4, and G6 are active remedies that address groundwater contamination and would restore groundwater quality over the long term. Alternatives G2, G4, and G6 would also rely on certain natural processes to achieve the cleanup levels for areas outside of the treatment zones.

Protectiveness under Alternatives G2 and G4 requires a combination of reducing contaminant concentrations in groundwater and limiting exposure to residual contaminants through maintenance of existing, and implementation of additional institutional controls, as well as MNA.

Protectiveness under Alternative G6 is achieved through reducing contaminant concentrations via extraction and treatment of groundwater. Alternative G6 also protects against the further migration of contaminated groundwater, as the extraction functions as a hydraulic plume containment mechanism.

The long-term monitoring program for groundwater and vapor would monitor the migration and fate of the contaminants and ensure that human health is protected. Combined with MNA, long-term monitoring, and institutional controls, Alternatives G2, G4, and G6 would meet the RAOs. Alternative G1 would not meet the RAOs

Because Alternative G1 (No Action) is not protective of human health and the environment, it was eliminated from consideration under the remaining evaluation criteria.

Compliance with Applicable or relevant and Appropriate Requirements (ARARs)

EPA and NYSDOH have promulgated health-based protective MCLs (40CFR Part 141, and 10NYCRR, Chapter 1), which are enforceable standards for various drinking water contaminants (chemical-specific ARARs).

The aquifer is classified as Class GA (6 NYCRR 701.18), meaning that it is designated as a potable water supply. Although the groundwater at the Site is not presently being utilized as a potable water source, achieving MCLs in the groundwater is an applicable or relevant and appropriate standard, because area groundwater is a source of drinking water. Alternatives G2 and G4 may

EVALUATION CRITERIA FOR SUPERFUND REMEDIAL ALTERNATIVES

Overall Protectiveness of Human Health and the Environment evaluates whether and how an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs) evaluates whether the alternative meets federal and state environmental statutes, regulations, and other requirements that pertain to the site, or whether a waiver is justified.

Long-term Effectiveness and Permanence considers the ability of an alternative to maintain protection of human health and the environment over time.

Reduction of Toxicity, Mobility, or Volume (TMV) of Contaminants through Treatment evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.

Short-term Effectiveness considers the length of time needed to implement an alternative and the risks the alternative poses to workers, the community, and the environment during implementation.

Implementability considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.

Cost includes estimated capital and annual operations and maintenance costs, as well as present worth cost. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30 percent.

State/Support Agency Acceptance considers whether the State agrees with the EPA's analyses and recommendations, as described in the RI/FS and Proposed Plan.

Community Acceptance considers whether the local community agrees with EPA's analyses and preferred alternative. Comments received on the Proposed Plan are an important indicator of community acceptance.

potentially reach ARARs in the active remediation area of the plume sooner than Alternative G6. However, chemical-specific ARARs will be attained through treatment and certain natural processes (dilution and dispersion) for groundwater in all three of these alternatives.

Alternatives G2, G4, and G6 would comply with location- and action- specific ARARs.

Long-Term Effectiveness and Permanence

Enhanced bioremediation under Alternative G2 is considered a reliable method for reducing contaminant concentrations in groundwater. In-well stripping under Alternative G4 and pump and treat under Alternative G6 are also considered effective technologies for treatment and/or containment of contaminated groundwater, if designed and constructed properly.

All three alternatives rely on a combination of treatment in the active remediation area, natural processes, including dilution and dispersion for areas where active remediation is not implemented, and institutional controls.

Enhanced bioremediation under Alternative G2 has been demonstrated to be effective and reliable at numerous sites for groundwater treatment for CVOCs in contaminated areas. However, groundwater concentrations may rebound if there is continued migration of CVOCs from unknown source areas. Enhanced bioremediation treatment may be required over the long-term to address continued migration of contaminants from unknown source areas into groundwater.

In-well air stripping under Alternative G4 is expected to be effective and reliable to significantly remove CVOCs. However, the effectiveness of this alternative is limited by radius of influence (ROI) or "reach" into the aquifer. The ROI will depend on pumping capacity of each well and the hydrogeologic characteristics of the Site. The ability to secure access to residential properties may impact the placement of the in-well air stripping wells and ultimately the effectiveness of the technology. In addition, the effectiveness of in-well air stripping may be limited in shallow aquifers, due to the lack of vertical space in the well for "stripping." A field pilot study would be necessary to determine pre-design parameters such as actual ROI, optimal well spacing, flow rates, and pumping capacity prior to full-scale implementation.

Some residual risk above levels of concern would remain under contaminated groundwater in Alternatives G2 and G4; these alternatives rely upon institutional controls and MNA for protection. Residual risk under Alternative G6 would likely be reduced below levels of concern over a longer-term remedial time frame as natural attenuation appears to be limited and contaminant removal from groundwater slower.

Reduction of Toxicity, Mobility, or Volume Through Treatment

Alternatives G2, G4 and G6 reduce the toxicity and volume of contaminants at the Site through treatment of contaminated groundwater. Alternative G2 uses

biological processes to degrade contaminants in groundwater to less harmful compounds. Alternative G4 uses physical processes to remove the contaminants from the aquifer, and provides chemical treatment for the collected vapor-phase contamination. Alternative G6 removes contaminated groundwater and treats it via a carbon treatment process. Alternative G2 does not remove contamination from the saturated zone, while Alternatives G4 and G6 do remove contamination.

Alternative G2 does not reduce the mobility of the contaminants in groundwater and Alternative G4 may change the movement of contaminants in groundwater because the in-well air stripping treatment is expected to create groundwater mounding. Alternative G6 would be the most effective at reducing the mobility of the groundwater contamination by providing hydraulic control of the plume.

Each of the three active alternatives includes an MNA component for the lesser contaminated portion of the plume outside the active remediation area. MNA would provide limited further reduction in the toxicity and volume of contaminants in groundwater by transforming them into less harmful substances through natural biological, chemical and other processes.

During the enhanced bioremediation and MNA biological degradation processes, PCE, TCE and cis-1,2-DCE could be transformed into the more toxic vinyl chloride under anaerobic conditions in the subsurface, prior to aerobic degradation to the less toxic ethane. This transformation would need to be monitored and managed to prevent exposure via drinking contaminated water or inhalation through the vapor intrusion pathway.

After treatment, Alternatives G4 and G6 would generate residuals in a form of used GAC that would require regeneration, destruction or disposal.

Short-Term Effectiveness

Alternatives G2, G4 and G6 may have short-term impacts to remediation workers, the public, and the environment during implementation. Remedy-related construction (e.g., trench excavation) under Alternatives G4 and G6 would require disruptions in traffic and street closure permits. In addition, Alternatives G4 and G6 have aboveground treatment components and infrastructure that may create a minor noise nuisance and inconvenience for local residents during construction.

Exposure of workers, the surrounding community and the local environment to contaminants during implementation of the three alternatives is minimal. No difficulties are foreseen with managing the required

quantity of the bioremediation injection material needed in Alternative G2, as it is non-hazardous. Excavation activities in Alternatives G4 and G6 could produce contaminated vapors that present some risk to remediation workers at the Site. Drilling activities, including the installation of monitoring, in-well air stripping, injection, and extraction wells for Alternatives G2, G4, and G6 could produce contaminated liquids that present some risk to remediation workers at the Site. The potential for remediation workers to have direct contact with contaminants in groundwater could also occur when groundwater remediation systems are operating under Alternative G6. Alternative G6 could increase the risks of exposure, ingestion and inhalation of contaminants by workers and the community because contaminated groundwater would be extracted to the surface for treatment. However, measures would be implemented to mitigate exposure risks.

All three alternatives include monitoring that would provide the data needed for proper management of the remedial processes and a mechanism to address any potential impacts to the community, remediation workers, and the environment. Risk from exposure to groundwater during excavation would also require management via occupational health and safety controls.

Groundwater monitoring and discharge of treated groundwater will have minimal impact on workers responsible for periodic sampling. The time required for implementation of Alternative G6 is estimated at 6 – 9 months. Alternatives G2 and G4 are estimated to take about 9 – 12 months to implement.

RAOs would be achieved in Alternatives G4, G2, and G6 within short, medium and longer time frames, respectively. In-well air stripping is expected to achieve groundwater RAOs within five to 20 years under Alternative G4. Enhanced bioremediation is expected to achieve RAOs within eight to 50 years under Alternative G2, and groundwater pump and treat technology is expected to achieve groundwater RAOs in 30 or more years under Alternative G6. The time frame to meet groundwater RAOs in the non-active remediation area where MNA/LTM would be implemented is difficult to predict, but is expected to exceed 30 years.

Implementability

All three technologies are well-established technologies that have commercially available equipment and are implementable. All three alternatives have access challenges that would have to be addressed with property owners. Of the three alternatives, Alternative G6 Groundwater Pump and Treat is probably the easiest alternative to construct at the Site and would require the

least amount of street closure permits and would require less land and disruption in residential areas. Alternatives G2 and G4 would be moderately difficult to construct in the residential areas, requiring securing access to homes and obtaining street closure permits. The need to reconfigure the treatment injection and in-well air stripping well locations in Alternatives G2 and G4 due to access constraints may be possible, however doing so potentially impacts the effectiveness and schedule of these remedial alternatives.

All alternatives would require routine groundwater quality, performance and administrative monitoring, including five-year CERCLA reviews. Alternatives G4 and G6 require periodic operations and maintenance (e.g., substrate injection, GAC replacement) for the life of the treatment.

Cost

The estimated capital cost, operation, maintenance and monitoring (O&M) and present worth cost are discussed in detail in the FS Report. The cost estimates are based on the best available information. Alternative G1 (No Action) has no cost because no activities are implemented. The present worth cost for Alternatives G2 and G4 are \$15.8 million and \$16.7 million, respectively. The highest present worth cost alternative is Alternative G6, at \$21.5 million.

The estimated capital, O&M and present-worth costs for each of the alternatives are presented below.

Alternative	Capital Cost	Annual O&M Cost	Present Worth
G-1	\$0	\$0	\$0
G-2	\$4,344,000	\$835,000	\$15,830,000
G-4	\$7,730,000	\$730,000	\$16,710,000
G-6	\$2,997,000	\$1,185,000	\$21,560,000

State/Support Agency Acceptance

NYSDEC concurs with the preferred alternative.

Community Acceptance

Community acceptance of the preferred alternative will be evaluated after the public comment period ends and will be described in the Record of Decision for this Site. The Record of Decision is the document that formalizes the selection of the remedy for a site.

PREFERRED REMEDY

Based upon an evaluation of the remedial alternatives, EPA, in consultation with NYSDEC, recommends

Alternative G6, Groundwater Pump and Treat, as the Preferred Alternative. Alternative G6 has the following key components: extraction of the groundwater via pumping and ex-situ treatment of the extracted groundwater prior to discharge to a POTW, surface water or reinjection to groundwater (to be determined during design); in-situ chemical treatment of targeted high concentration contaminant areas, as appropriate; monitored natural attenuation for the areas where active remediation is not performed; long-term monitoring in conjunction with implementation of institutional controls. In addition, EPA will continue to evaluate the potential for vapor intrusion at the Site, and will install vapor mitigation systems, where necessary.

The groundwater extraction well network will be designed to effectuate removal of the contaminant mass from the groundwater plume and establish hydrodynamic control of the plume. Figures 4 and 5 provide the conceptual pump & treat well locations within the shallow and deep UGA plume areas. The exact number of extraction wells and their placement will be determined in the remedial design. An aquifer pump test would be conducted as part of the pre-remedial design to collect necessary aquifer data necessary to complete the design of the groundwater pump and treat system.

The use of in-situ chemical treatments, targeting areas containing high concentrations of PCE that may reside outside the radius of influence of the pump within the inferred plume, as appropriate, in combination with groundwater extraction could potentially reduce the remediation time frames and the cost of this alternative. The implementation of in-situ chemical treatment (e.g. ISCO, ISCR) will be designed to enhance the remediation of the contaminated groundwater in conjunction with the pump and treat system. The remedial design will determine how best to execute the ISCR or ISCO with the pump and treat system.

A treatment plant with the capacity to achieve the mass removal and hydraulic control objectives of the remedy will be constructed within or nearby the Site. EPA estimates that a capacity of 350 gallons per minute may be required. The extracted groundwater would be treated for CVOC removal with either liquid phase GAC or air stripping, or both. Treated groundwater effluent will be discharged to a POTW, surface water, or reinjected to groundwater. The method of discharge will be determined in the remedial design. The design of the treatment facility will take discharge requirements into account.

The pump and treat system would operate until MCLs are attained in the shallow and deep UGA at the Site. The FS presents calculations determining the duration of the operation of the extraction system. These calculations to

determine the remedial time frame require additional data regarding contaminant mass flux, as well as more detailed process design to determine the actual number of recovery/injection wells and pore volumes of clean water required to reach RAOs. This data will be collected during the pre-remedial design phase. EPA assumes the duration of this alternative is 30 years or more.

The environmental benefits of the preferred remedy may be enhanced by consideration, during the design, of technologies and practices that are sustainable in accordance with EPA Region 2's Clean and Green Energy Policy¹. This will include consideration of green remediation technologies and practices, including GAC regeneration.

Monitored natural attenuation is a necessary component in those areas where active remediation is not anticipated, such as the areas of lower contaminant concentrations at edges of the contaminant plume.

A long-term groundwater monitoring program would be implemented to track and monitor changes in the groundwater contamination and ensure the remedial action objectives are attained. The results from the long-term monitoring program will be used to evaluate the migration and changes in the contaminant plume over time. The long-term monitoring program will be modified accordingly.

The groundwater monitoring well sample results will also be used to track changes in the contaminant plume in order to determine homes considered "at risk" for vapor intrusion. Selected structures/homes determined to be "at risk" would be sampled periodically for vapor intrusion during the winter heating season.

Vapor intrusion caused by volatilization from the groundwater contaminant plume has been monitored by EPA. To date, 15 homes have been sampled and one home has been outfitted with a vapor mitigation system. These systems would be inspected periodically to ensure that they are operating properly. A review of groundwater and vapor data would be relied upon to determine which homes without vapor mitigation systems would be tested in that year's monitoring program. These homes would be monitored through collection of three samples (sub-slab, basement, and first floor) at each building. Vapor extraction systems would be installed, if warranted. EPA will continue to investigate the soil vapor intrusion pathway at the Site.

Institutional controls are incorporated into this remedy for protection of human health and the environment over the long term. EPA anticipates using existing government controls to prevent use of groundwater and informational and or governmental controls to ensure that vapor intrusion issues are identified.

While this alternative will ultimately results in reduction of contaminant levels in groundwater to levels that would allow for unlimited use and unrestricted exposure, it will take longer than five years to achieve these levels. As a result, in accordance with EPA policy, the Site is to be reviewed at least once every five years.

Basis for the Remedy Preference

EPA is proposing Alternative G6 due to the difficulty in implementing Alternatives G2 and G4 in the densely populated and fully-developed residential and commercial setting of the Site. Alternative G2, and Alternative G4 to a somewhat lesser degree, would require securing access to a significant number of residential properties to perform construction activities. Under Alternatives G2 and G4, access would be necessary to the residential properties for an extended period of time to perform the initial construction activities and to subsequently conduct monitoring. Under Alternative G2, multiple injections are likely to be necessary over time. These activities would cause a significant disturbance to the residential neighborhood. Reconfiguration of the injection or in-well stripping wells due to access constraints could potentially impact significantly the effectiveness of the technology. Access to install extraction wells under the preferred remedy, Alternative G6 Groundwater Pump and Treat, though still complicated, is more manageable. Access to property and construction of the treatment plant would be performed in an area zoned for commercial activity. Furthermore, the uncertainty of an unknown source investigation that could result in a continued migration of contamination from source areas adds to the uncertainty that the remedial action objectives would be achieved with Alternative G2.

Alternative G6, Groundwater Pump and Treat, uses proven technologies that can be more readily implemented than the other alternatives. The treatment components can be expanded to improve treatment effectiveness or decrease the remedial time frame, if required. Groundwater Pump and Treat has been demonstrated as an effective remedial approach for contaminant mass removal over the long term. This approach would be particularly effective as the contaminant plumes are relatively accessible and have a specific configuration. The shallow UGA groundwater (0 to 20 feet bgs) PCE plume is approximately 3,500 feet long and between 400 and 100 feet wide. The deep groundwater plume is approximately

¹ See http://epa.gov/region2/superfund/green_remediation.

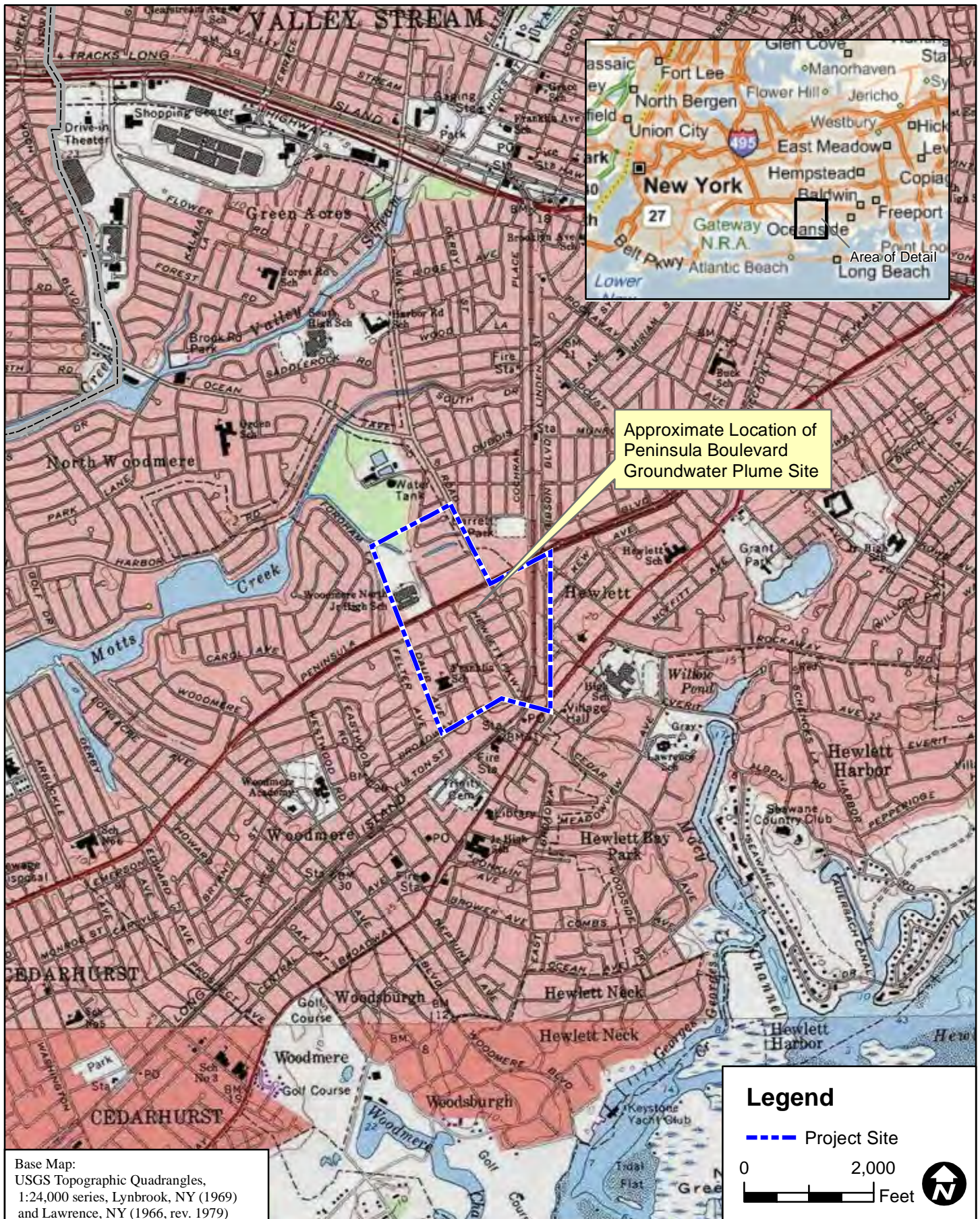
1,110 feet long. Groundwater Pump and Treat would also be the most effective of the alternatives in establishing hydrodynamic control of the aquifer to minimize off-site migration of contaminants and isolate the contaminated groundwater area. The prevention of off-site migration would prevent CVOC contamination from flowing toward the LIAWC well field. Long-term groundwater monitoring would ensure that remedial action objectives are achieved at the Site.

The preferred remedy is more expensive than either Alternatives G2 or G4. However, there is a greater degree of uncertainty that the remedial action objectives would be achieved by both Alternatives G2 and G4. Based on the Site conditions, Alternative G6, Groundwater Pump and Treat, is the most effective of the alternatives.

The addition of in-situ chemical treatments targeting areas containing high concentrations of PCE that may reside outside the radius of influence of the pump within the inferred plume, as appropriate, in combination with groundwater extraction could potentially reduce the remediation time frames by reducing the contaminant mass of PCE, and, therefore, the costs of this alternative.

EPA, in conjunction with NYSDEC, believes that Alternative G6, Groundwater Pump and Treat, would be protective of human health and the environment, provide the greatest long-term effectiveness, comply with ARARs, and be cost-effective among alternatives with respect to the evaluation criteria. The preferred remedy also will meet the statutory preference for the use of treatment as a principal element.

\\nrl-ar3\gis_projects\43005_USEPA_REGION_20112840_EPAR2-002RICO02TV-PENINSULA\GIS\map_docs\mxd\Draft_RI_Rpt\Figure 1-1_Site_Location.mxd



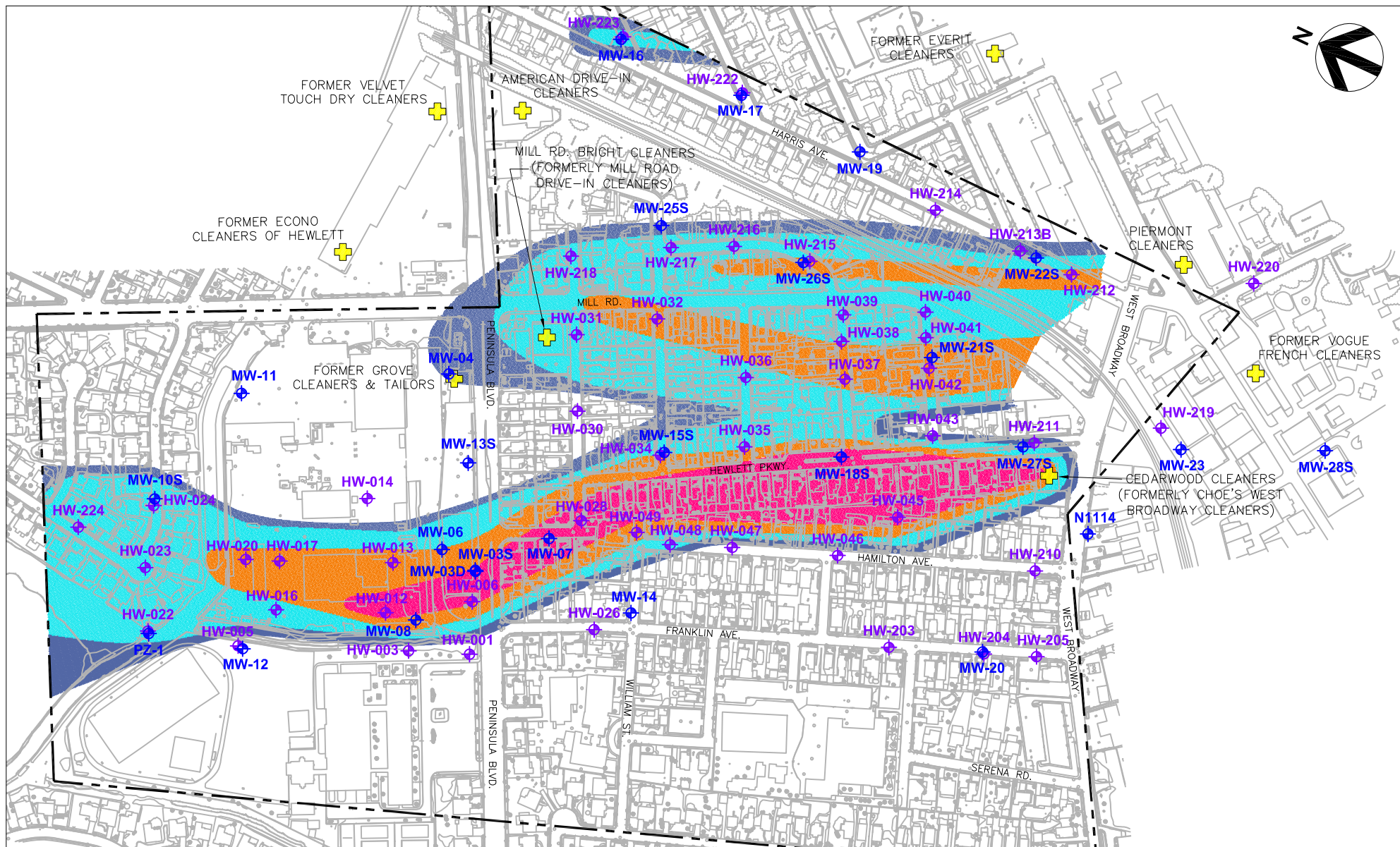
Base Map:
USGS Topographic Quadrangles,
1:24,000 series, Lynbrook, NY (1969)
and Lawrence, NY (1966, rev. 1979)



Site Location - Peninsula Boulevard Groundwater Plume RI
Town of Hempstead, Village of Hewlett
Nassau County, New York

Job No.	Date	Figure No.
112840	01/25/11	1

500157



SCALE: 1"=400'

HDR

Henningson, Durham &
Richardson, Architecture and
Engineering, P.C. In Association
with HDR Engineering, Inc.

SHALLOW UGA PLUME MAP

FEASIBILITY STUDY
PENINSULA BOULEVARD GROUNDWATER PLUME
TOWN OF HEMPSTEAD, VILLAGE OF HEWLETT,
NASSAU COUNTY, NEW YORK

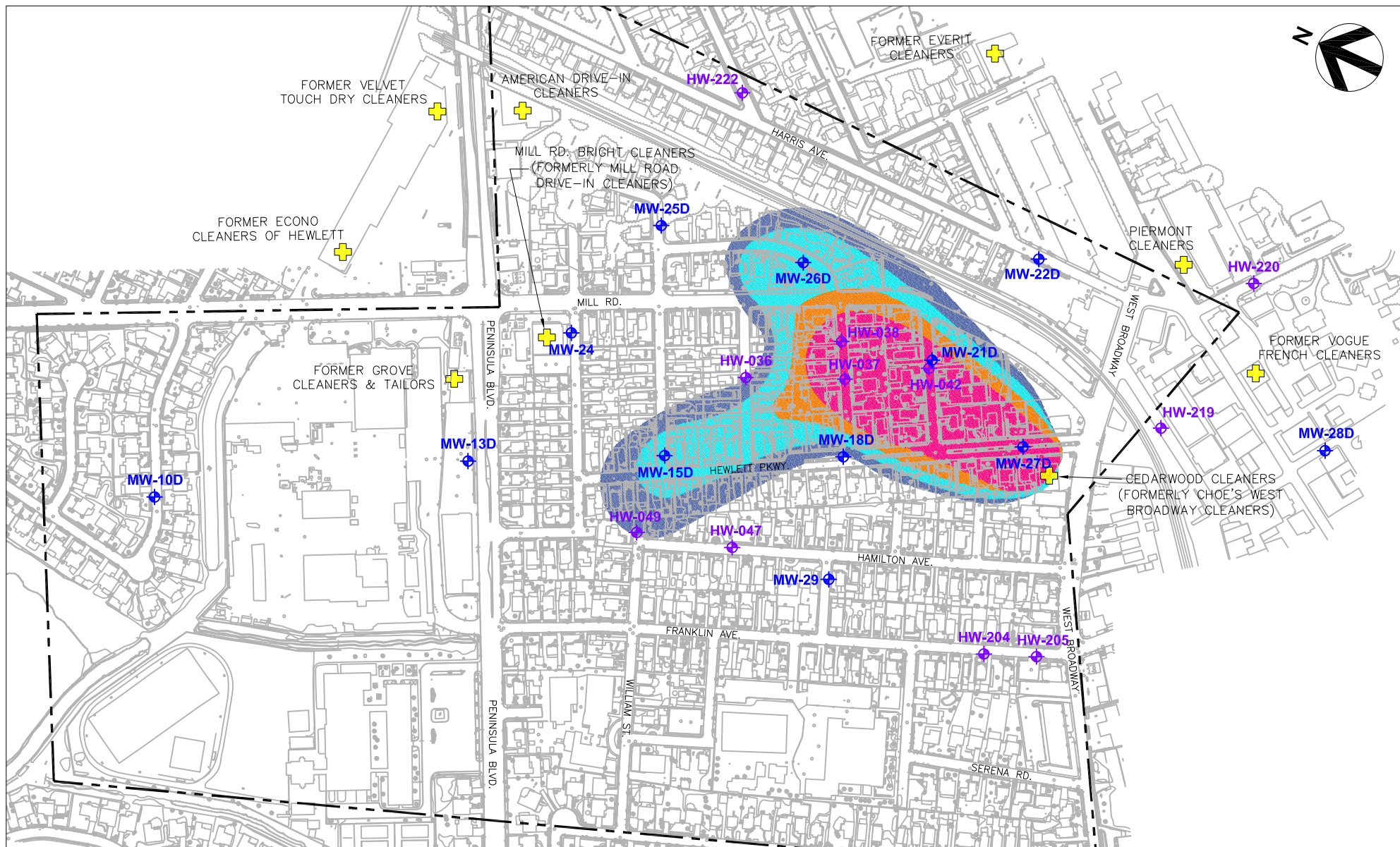
DATE

06-23-2011

FIGURE

2

500158



SCALE: 1"=400'

HDR

Henningson, Durham &
Richardson, Architecture and
Engineering, P.C. In Association
with HDR Engineering, Inc.

DEEP UGA PLUME MAP

FEASIBILITY STUDY
PENINSULA BOULEVARD GROUNDWATER PLUME
TOWN OF HEMPSTEAD, VILLAGE OF HEWLETT,
NASSAU COUNTY, NEW YORK

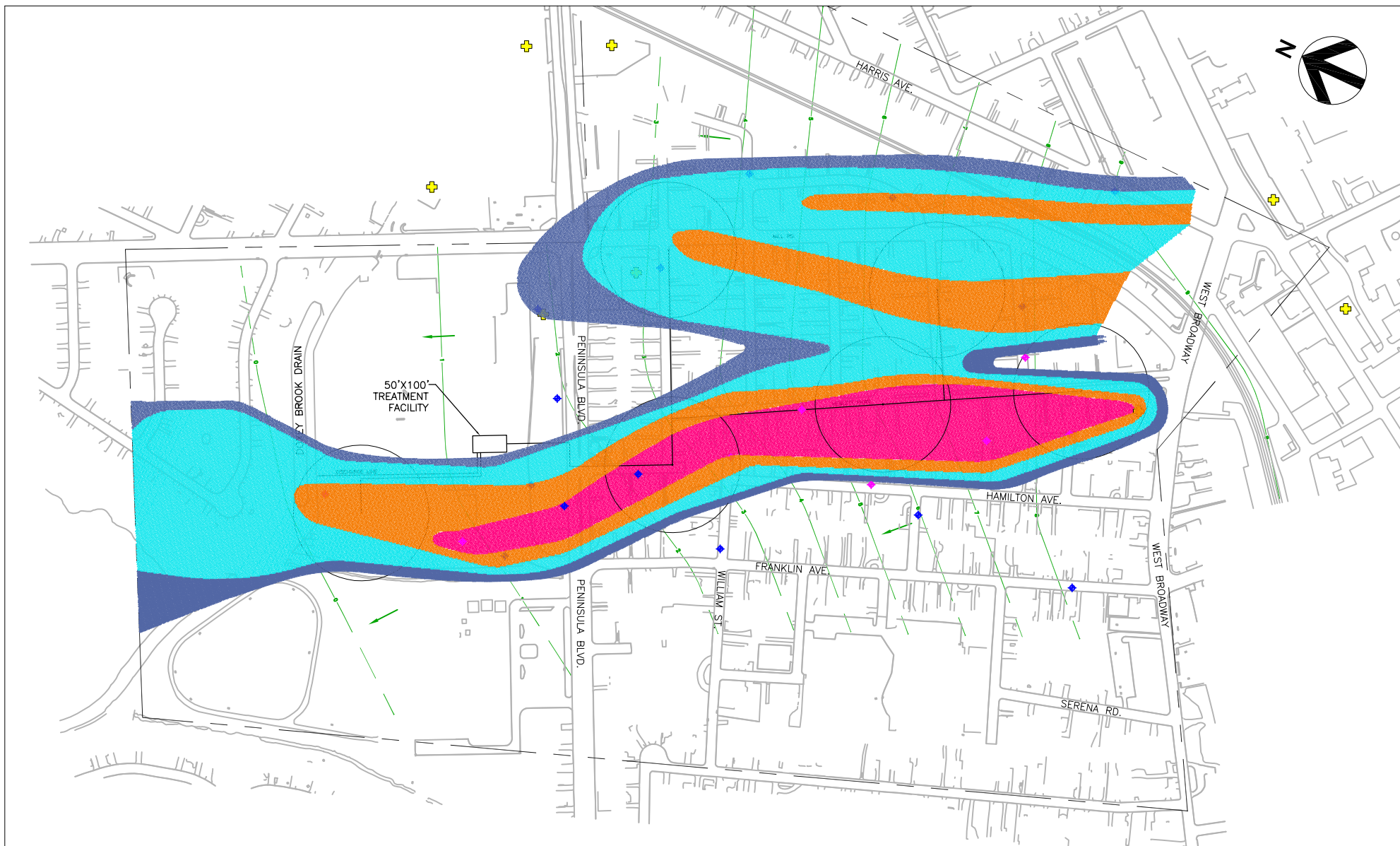
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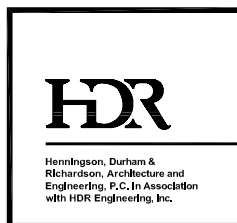
FIGURE

3

500159



SCALE: 1"=400'



SHALLOW UGA PUMP & TREAT LOCATIONS

FEASIBILITY STUDY
PENINSULA BOULEVARD GROUNDWATER PLUME
TOWN OF HEMPSTEAD, VILLAGE OF HEWLETT,
NASSAU COUNTY, NEW YORK

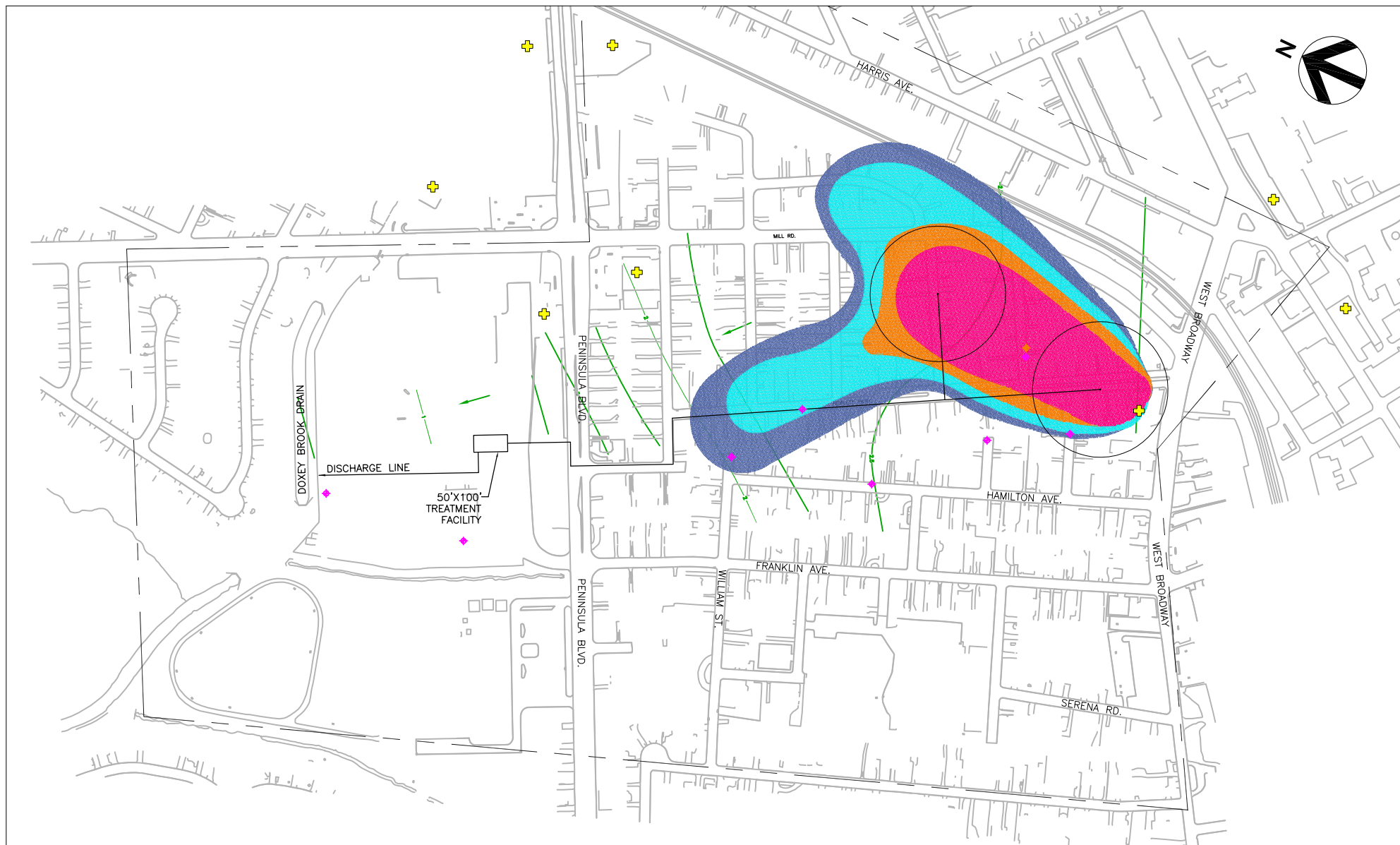
DATE

06-23-2011

FIGURE

4

500160



SCALE: 1"=400'

HDR

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Richardson, Architecture and
Engineering, P.C. In Association
with HDR Engineering, Inc.

DEEP UGA PUMP & TREAT LOCATIONS

FEASIBILITY STUDY
PENINSULA BOULEVARD GROUNDWATER PLUME
TOWN OF HEMPSTEAD, VILLAGE OF HEWLETT,
NASSAU COUNTY, NEW YORK

DATE

06-23-2011

FIGURE

5

500161

RESPONSIVENESS SUMMARY

APPENDIX V-b

**PUBLIC NOTICE PUBLISHED IN THE
*SOUTH SHORE STANDARD ON JULY 28, 2011***



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY INVITES
PUBLIC COMMENT
ON THE PROPOSED REMEDY FOR
THE PENINSULA BOULEVARD SUPERFUND SITE IN HEMPSTEAD, NEW YORK**

The U.S. Environmental Protection Agency (EPA) will hold a public meeting on Wednesday, August 3, 2011 at 7:00 pm at the Hewlett High School, 60 Everit Avenue, Hewlett, NY to discuss the preferred remedy for the Peninsula Boulevard Superfund Site and the basis for this preference. The preferred remedy, which is described in the proposed plan is the extraction and on-site treatment of contaminated groundwater.

Before selecting a final remedy, EPA will consider oral comments presented at the public meeting and written comments received on or before August 27, 2011.

Copies of the Proposed Plan and the Administrative Record for the site are available at the following locations:

Hewlett-Woodmere Public Library
1125 Broadway
Hewlett, NY 11557
516-374-1967

US EPA Records Center
290 Broadway, 18th Floor
New York, NY 10007
212-637-4308

Hours: Monday-Thurs 9am to 9pm
Friday 9am to 6pm
Saturday 9am to 5pm
Sunday 12:30pm to 5pm

By Appointment Only

Thirty Day comment period begins July 28, 2011. All written comments should be sent to:

Gloria Sosa, Project Manager
U.S. EPA, Region 2
290 Broadway, 20th Floor
New York, NY 10007
sosa.gloria@epa.gov
fax: 212-637-4283

For further information, please contact Cecilia Echols, Community Involvement Coordinator at (212) 637-3678 or toll free at 1-800-346-5009 or visit our website @
www.epa.gov/region2/superfund/npl/peninsulaboulevard

500163

RESPONSIVENESS SUMMARY

APPENDIX V-c

AUGUST 23, 2010 PUBLIC MEETING SIGN-IN SHEET



Peninsula Boulevard Groundwater Plume Superfund site

Public Meeting – Wed., August 3, 2011

Hewett High School

Hewett, New York

PLEASE PRINT CLEARLY

NAME	ADDRESS (with Zip Code)	E-mail	Organization
Richard Ruge			LIAW
AMY H. ELISI			LIAW
RICHARD KEAN			LIAW
Brad Williams			HDR
Lisa Joyce			HDR
Amrita Patni			HDR
Scott P Moore		Scott.moore@StandardInc.com	South Shore Standard
MORRIS KRAMER	P.O. Box 129 Hewett, NY 11509		SELF
Harold Kislak	1335 Peninsula Ave Hewett 11557		
Joe Whitney	P.O. Box 11 Woodmere NY 11598	jwglodenine54@aol.com	Hewett Fire Dept.



Peninsula Boulevard Groundwater Plume Superfund site
Public Meeting – Wed., August 3, 2011
Hewett High School
Hewett, New York

PLEASE PRINT CLEARLY

NAME	ADDRESS (with Zip Code)	E-mail	Organization
Stephen Brunner		Stephen.brunner@patch.com	Patch
Merrill Borg	1417 Broadway 3F Hewlett NY 11557		Self
Joseph DeFranco	Nassau Co Health		NCDIT
Toby Nosbaum	Cong. Carolyn McCarthy	toby.nosbaum@mail.house.gov	



Peninsula Boulevard Groundwater Plume Superfund site

Public Meeting – Wed., August 3, 2011

Hewett High School

Hewett, New York

PLEASE PRINT CLEARLY

NAME	ADDRESS (with Zip Code)	E-mail	Organization
Arnold Pallaschi	1236 Waverly St Hewett	Pals.Six@Verizon.NET	
Michael Musso	HDR Inc	michael.musso@hdr.com	
Jan Herock	300 Hewett Plwy Hewett		Self.

RESPONSIVENESS SUMMARY

APPENDIX V-d

AUGUST 23, 2010 PUBLIC MEETING TRANSCRIPT

1
2 UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
3 REGION 2

4 - - - - -x

5 PENINSULA BOULEVARD GROUNDWATER

6 CONTAMINATION SUPERFUND SITE

7 PUBLIC MEETING

8 - - - - -x

9 Hewlett High School
10 60 Everit Avenue
11 Hewlett, New York

12 August 3, 2011
13 7:00 p.m.

14 P R E S E N T:

15 GLORIA M. SOSA,
16 EPA Remedial Project Manager

17 PIETRO MANNINO,
18 EPA Section Chief
19 Western New York Remediation Section

20 CECELIA ECHOLS,
21 EPA Community Involvement Coordinator

22 LORI SMITH,
23 EPA Human Health Risk Assessor

24 MELISSA SWEET,
25 NYSDEC Remedial Project Manager

1
2 (Whereupon, a video
3 recording of the public meeting
4 already in progress began prior to
5 the arrival of the court
6 reporter.)

7 MS. SOSA: So, the law is
8 commonly known as Superfund, but
9 it's called the Comprehensive
10 Environmental Response
11 Compensation and Liability Act,
12 and it's known as CERCLA or
13 Superfund.

14 And that enables -- that was
15 a law that Congress passed in 1980
16 in response to some hazardous
17 sites; one of them, the most
18 famous one, being the Love Canal
19 in Niagara Falls.

20 And, so, the Superfund
21 provides federal funds for the
22 cleanup of hazardous waste sites,
23 and it also enables the EPA to
24 make people who are responsible
25 for the contamination to either

Proceedings

pay for the cleanup or to conduct
some response actions themselves.

Next slide, please.

So, the Peninsula Boulevard
site was added to EPA's National
Priorities List in 2004. And once
the site is listed on the National
Priorities List, then it enables
EPA to initiate and to fund the
cleanup.

This is a regional -- a map
of the region. If you can see
down here, we have the south
shore, and then we're up here in
Hewlett. The blue lines are the
outline of the site. And the site
is comprised of where the area of
contaminated groundwater is, so
it's not a street boundary, it's
the area of where there's
groundwater contamination.

Next slide, please.

This is a satellite map
which shows it a little more

Proceedings

clearly. Here, we have Peninsula Boulevard, we have the middle school, and this is the Keyspan property, to orient you. This is the Long Island Water Corp., we have Mill Road, and then we're over here in this area.

Next slide.

So, some background on the site. From 1991 to 1999, the New York State Department of Environmental Conservation conducted several investigations at the former Grove Cleaners site. And that's a dry cleaner that was located on Peninsula Boulevard where the Chinese restaurant is now that's close to the CVS parking lot, if you're familiar where that is.

And they took out some contaminated sediments from the dry wells of the cleaners, and they discovered that there was

Proceedings

groundwater that was contaminated with dry cleaning fluid.

Now, another name for dry cleaning fluid is tetrachloroethylene or perchloroethylene. And, so, we get the initials PCE, and that's how I'll refer to the dry cleaning fluid.

And they found that there was a contaminant plume, an area of contaminated groundwater, that extended both north and south of Peninsula Boulevard.

So, they couldn't determine that -- they couldn't define the source of the contamination solely as the Grove Cleaners site because the contamination went both to the north and to the south.

So, they wrote a no further action remedy in 2003 because they had already removed -- they had already performed some removal

Proceedings

actions, and then they referred the site to EPA.

The hydrogeology is the study of ground -- of water that's in the ground, of its flow, its movement.

And under the site here, we have -- the topmost layer of aquifer is where the groundwater flows and it's what we call the upper glacial aquifer. And I've divided that into two sections; into the shallow upper glacial aquifer -- and that's between zero and thirty feet below the ground -- and the deep upper glacial aquifer, which is not very deep, it's only between 40 and 75 feet. There are two distinct plumes. That's why I separated it into shallow and deep areas, and I'll show you those later on. And there's some clay that's in between.

Proceedings

And as you know from living in this area, the depth to the groundwater is very shallow. You find groundwater anywhere from between three to fifteen feet. The upper glacial aquifer at the very top, that overlies the Jameco aquifer.

Next slide, please.

The Long Island American Water Company is the local water company for this area and they operate a well field about a thousand feet to the north of the site.

Since 1991, the Long Island American Water Corp. has been cleaning the groundwater that's pumped from this well field with an air stripper. And they conduct extensive monitoring of all the water that's in their system.

Next slide, please.

And the drinking water

Proceedings

standards have not been exceeded in the public water supply. I wanted to make that point very clear, that the drinking water supply has no exceedances of drinking water standards.

The Water Corp., in addition to mailing out their quarterly water quality reports, has a very good website where you can look and they have various -- they have a very detailed report and they have a less in-detail report depending on what you'd like to see.

Then I also wanted to note that the water that's delivered to residences in this area is not necessarily solely from that Well Field No. 5. It's a blend of -- they have the Long Island Water Corp. has various well fields over the area. So, depending on supply and demand, the water that's

Proceedings

delivered is a blend of the
different well fields.

Next slide, please.

Just to give you an idea,
this is Peninsula Boulevard and
Mill Road. So, we had the Keyspan
area, we had the school with the
ballfields in the back, and this
is the Long Island American Water
Corp. area well field. I wanted
you to see where it was located.

EPA conducted a Remedial
Investigation at this site. And
the purpose of a Remedial
Investigation is to determine what
we call the nature and extent of
contamination at the site.

We want to find out where
the contamination is, what it is,
where it is, then we want to
identify if there are any threats
to human health and to the
environment.

So, in order to do so, we

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collect samples of all the effected media. We collected groundwater samples, surface water samples, soil, and sediment.

And during the Remedial Investigation, we collected 39 subsurface soil samples, we collected 160 groundwater samples from 61 different locations. So, we collected them at different depths in those same locations.

And that was done for screening purposes. We wanted to find out what was the quality of the groundwater so that we can install our permanent monitoring wells. And we've installed 26 of those and we've taken several rounds of groundwater samples from them.

And the Remedial Investigation data showed that yes, there's a groundwater plume that's contaminated with PCE, with

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the dry cleaning fluid, and with the breakdown products of dry cleaning fluid. When you have a compound that's either in the soil or in the sediment, you have what's called breakdown products or daughter product. And the ones for PCE are TCE -- and that's trichlorethylene -- and vinyl chloride is another one.

Next slide, please.

So, the highest level of PCE that was detected in the groundwater was 30,000 micrograms per liter; and of TCE, 10,000 micrograms per liter.

So, I put the drinking water standard for PCE as five micrograms per liter. So, you can see that the hot area, the area of the high concentration, is quite high compared to the drinking water standard.

The maximum contaminant

Proceedings

level is another word for drinking water standards, and that was from the Safe Water Drinking Act. So, if you see that MCL, it means a drinking water standard.

And these are the average -- I told you the highest concentration of PCE was 30,000. The average concentration, averaged over the whole plume, which we used in our risk assessment, is 11,000 micrograms per liter and of TCE it was 920.

Next slide, please.

So, the shallow groundwater PCE plume was about 3,500 feet long, and it runs in a north-south direction. And south of Peninsula Boulevard, it's 1,000 feet wide. And then north of Peninsula Boulevard, it's narrower, it's four hundred feet wide.

Excuse me, are you the stenographer?

Proceedings

THE COURT REPORTER: Yes.

I was waiting at the
library.

MS. SOSA: Oh, I'm sorry.

If I could just have one
moment to have the stenographer
set up.

THE COURT REPORTER: Thank
you.

(Pause in proceedings)

MS. SOSA: The area that I
was mentioning, the red area is
above a thousand micrograms per
liter. That's the hottest area.
Then we have a little less hot
until we get to where we find
clean water. So, it's kind of the
hottest area is skinny and long
and narrow.

Then in the deeper -- the
deeper plume in the upper glacial
aquifer, it's about a thousand
feet long, and that's oriented in
a little bit in a different

Proceedings

1
2 direction, northeast and
3 southwest, instead of north and
4 south, because that's the
5 direction of groundwater flow in
6 that area.

7 And the Remedial
8 Investigation showed that the data
9 showed that the groundwater plume
10 is quite stable. It hasn't really
11 moved.

12 This is a picture of the
13 smaller, deeper plume. You can
14 see this is the area of higher
15 concentrations.

16 So, we have not yet defined
17 the source of the groundwater
18 contamination. We've looked,
19 we've taken soil samples, we've
20 looked at sewers, but we have not
21 yet defined the source of the
22 contamination. In order to clean
23 up the groundwater, we'll go much
24 more quickly if we can find the
25 source.

Proceedings

1
2 So, we've opened up what we
3 call a second operable unit for
4 the investigation, and that's
5 going to be to look for the
6 source. We call it source
7 delineation. So, we're going to
8 continue to investigate the source
9 area.

10 EPA performed a human health
11 risk assessment, and it was
12 determined that there were no
13 current unacceptable risks to
14 human health. And that's because
15 no one is drinking the
16 contaminated groundwater.
17 Everyone is on public water
18 supply.

19 However, site-related
20 contaminants, as I mentioned, have
21 been found in the groundwater
22 above drinking water standards.
23 So, EPA uses a future use
24 scenario, where you have people
25 drinking the contaminated

Proceedings

groundwater. And if that occurs, if people drink the groundwater, then there are unacceptable risks to human health.

Next slide.

We performed a screening-level ecological risk assessment, and we found that there were no unacceptable risks to either animals on land or animals in water. There was no unacceptable risks from surface water, from sediment, or from surface soil.

We developed remedial action objectives for groundwater for the site. And what those are, it's what the outcome that we want to happen at the site after the cleanup.

And, so, we want to restore the aquifer to drinking water standards. New York State declares that its aquifer is a source of potable water, and, so,

Proceedings

1
2 we want to bring it back to
3 groundwater -- to drinking water
4 standards.

5 And then we also want to
6 reduce or completely eliminate the
7 potential for this plume to move,
8 to migrate, towards the Long
9 Island American Water Corp.

10 (Whereupon, the court
11 reporter began to record the
12 public meeting stenographically.)

13 Then we also developed
14 remedial action objectives for
15 soil vapor, and I'll explain soil
16 vapor in a moment.

17 We want to address any
18 current or future potential
19 exposures, future exposures,
20 through the inhalation of vapors
21 that may seep into buildings.

22 When you have contaminated
23 groundwater or contaminated soil
24 that's contaminated with volatile
25 organic compounds --

Proceedings

I'm sorry. Thank you.

-- you could have the
contaminants volatilizing and
rising through the soil. And they
have the potential to move into
cracks into people's foundations
or buildings or through sewer
lines or through openings.

Next slide, please.

So, here's a schematic that
shows where we have some
contaminated soil and we have some
contaminated groundwater. And
this shows the vapors that are
coming up, and they potentially
could enter buildings.

Next slide.

So, EPA sampled several
buildings at the site -- I think
approximately twelve or
thirteen -- and we drilled small
holes through the slabs in their
basements, perhaps the size of a
quarter, and we installed a port

Proceedings

1
2 in these holes. And then we
3 installed a sampling device that
4 pulled air out through. And, so,
5 we could sample what was below
6 people's homes. And then we did
7 the same thing, we sampled the
8 indoor air in their homes to see
9 if there's any intrusion of these
10 vapors.

11 And this is a sampling
12 device, a sampling device, that we
13 used to collect the air. You can
14 see there's a small hole -- I
15 don't know if you can see it -- in
16 the basement floor, and then
17 there's a tube. And this -- it
18 looks like a coffee urn -- is
19 under negative pressure. So, when
20 we open the valve over there, it
21 starts to draw the air in and it
22 sucks the air in slowly over a 24-
23 hour period so we get a
24 representation of what's there for
25 24 hours. And then we remove this

Proceedings

canister and we send it to the laboratory for analysis.

And this is a picture of one of these canisters decorating someone's home. And that was to take the indoor air samples in their living room, to see if there was any impact.

If EPA finds in these investigations that there are indoor air concentrations of PCE and TCE above a level of concern, then we will install what's we call a subslab depressurization system. And that's like the radon venting system, and it vents the contaminants so they don't enter -- the vapor does not enter the home.

This is what one of these systems would look on the outside, flush mounted to the wall, kind of a fan thing, just to give you an idea what it looks like.

Proceedings

1
2 So, once the remedial
3 investigation is complete, then we
4 perform what we call a feasibility
5 study. And that looks at the
6 remedial alternatives that could
7 address the contamination that's
8 present at this site.

9 So, we wanted to see what
10 are the remedies, remedial
11 actions, that are appropriate for
12 this kind of contamination. And
13 the Feasibility Study for the site
14 presents an analysis of four
15 remedial alternatives for the
16 groundwater.

17 These four alternatives are
18 no action, enhanced
19 bioremediation, in-well air
20 stripping, and groundwater pump
21 and treat.

22 So, once we finish the FS,
23 then we develop a proposed plan,
24 and that's the stage that we're at
25 now. And some of you have taken

Proceedings

copies of the proposed plan that we had outside.

The proposed plan gives a little summary of the Remedial Investigation and Feasibility Study, and then it compares the alternatives and it looks at certain valuation criteria, and then it gives the preferred remedy of both EPA and New York State.

And we have a public comment period on the proposed plan, as Cecelia indicated, from July 28 until August 27, so it's a 30-day comment period. And the final alternative will not be chosen until EPA and DEC consider all of the comments made by the public.

The first alternative that we looked at was no action. And just like it sounds, that's what it is; nothing was done. No cleanup is done, no engineering controls are put in the site, you

Proceedings

1
2 just have the contaminated
3 groundwater remaining. And the
4 reason that we look at that is
5 because then we will compare the
6 other alternatives to doing
7 nothing.

8 Next.

9 So, we looked at enhanced
10 bioremediation. Microorganisms,
11 or bacteria, in the soil and water
12 that are present there naturally,
13 they consume organic compounds as
14 food. So, bioremediation is just
15 the process of these
16 microorganisms, these bacteria,
17 destroying contaminants in situ,
18 in the ground, in soil and water.

19 So, we would install wells
20 to deliver microbes, if necessary,
21 to deliver nutrients for these
22 microbes, and we would manipulate
23 groundwater conditions to have
24 these microbes thrive.

25 This is one of the injection

Proceedings

1 wells that would deliver the
2 microbes and nutrients, things
3 like that. The groundwater is
4 flowing this way, from left to
5 right. This is a monitoring well,
6 and then this would be an
7 extraction well; during treatment,
8 you can put it back and forth.
9

10 Next slide, please.

11 Now, this is a plan view.
12 These would be the wells lined up
13 like this. So, you could see that
14 in order to remediate this plume,
15 you would need quite a few of
16 these wells.

17 The next alternative that we
18 looked at was in-well air
19 stripping. And that is a physical
20 treatment technology, where air is
21 injected into a vertical well
22 that's screened and has holes at
23 two depths; at the top and at the
24 bottom.

25 So, pressurized air is

Proceedings

1 injected into the well and then
2 the water aerates and rises up.
3 It flows out of the system, and
4 then water will continue to go up
5 that well and perform a
6 recirculation pattern, and
7 contaminated groundwater is drawn
8 in at the bottom.
9

10 Next slide, please.

11 So, the partially treated
12 groundwater, as I mentioned, is
13 never brought up to the surface.
14 It keeps recirculating. The vapor
15 is extracted and vapor treated,
16 and each time it goes through the
17 system, through the well, the
18 contaminant mass is reduced.

19 Next slide, please.

20 So, here we have a picture
21 of this, our schematic of the
22 well. Here, we have air that's
23 injected deep into the well, then
24 it rises, contaminated groundwater
25 comes in, clean water goes out, we

Proceedings

1
2 have a recirculation pattern, and
3 then vapors come off here and are
4 brought through a treatment
5 system.

6 And then, again, this is a
7 plan view, and these are all
8 similar to the last one. These
9 are the wells, the in-wells that
10 we would use.

11 The final alternative that
12 we looked at was groundwater pump
13 and treat. And that is the
14 installation of wells and the
15 extraction of the groundwater via
16 these pumping wells, and then the
17 groundwater is treated before
18 disposal. So, you remove -- you
19 physically remove the water and
20 treat it to remove the contaminant
21 matter.

22 Next slide, please.

23 For the groundwater,
24 extraction wells would be
25 installed both in the upper

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1
2 glacial aquifer and in the shallow
3 and the deep areas, and then we
4 would have to construct a
5 treatment plant and we would then
6 treat the extracted groundwater,
7 contaminated groundwater, we would
8 either treat it with liquid phase
9 granular-activated carbon or with
10 an air stripper or both, and that
11 will all be determined during our
12 design phase.

13 In order to reduce the
14 amount of time that the
15 groundwater pump and treat would
16 take to clean up this groundwater,
17 we would like to enhance this
18 remedy with an in-situ chemical
19 treatment. And during the design
20 period, we're going to do a
21 treatability study to evaluate the
22 use of the in-situ chemical
23 oxidation, the ISCO reduction, and
24 then during that phase, we will
25 determine where to place these

Proceedings

treatments.

So, here we have -- this is the extraction well here, water is pumped out into a holding tank, either treated through granular-activated carbon...

This is the same plume, but you can see here that we would have fewer wells and they would have a larger -- what we call a radius of influence. So, the water would be drawn into the well and it would control these areas.

We don't know how many wells we would use. All of that and where we would place the treatment, all of that will be determined during the remedial design.

So, once we have all the alternatives, then we have criteria for analyzing these alternatives. The most important two are the overall protection of

Proceedings

1
2 human health and the environment
3 and the compliance with what we
4 call ARARs, and those are
5 Applicable or Relevant and
6 Appropriate Requirements.

7 So, those are the standards
8 that we would want to come up to.
9 And in this case, an ARAR would be
10 the drinking water standard. So,
11 the remedy that we choose must be
12 able to clean up the groundwater
13 to drinking water standards.

14 Then the other, we have
15 long-term effectiveness and
16 permanence of the remedy, the
17 ability to reduce the toxicity and
18 the mobility and the volume of the
19 waste -- of the contamination; we
20 have the short-term effectiveness
21 of the remedy; the
22 implementability, can we actually
23 design and install it; the cost of
24 the remedy; and then whether New
25 York State accepts the remedy and

Proceedings

whether the community accepts the
remedy.

So, in the case of the
Peninsula Boulevard site, we
recognize that remedy
implementation is going to pose
unique challenges for us. We have
a very dense residential
neighborhood, and, so, we're
cognizant of the issues and
difficulties that we will face.

So, when we do our remedial
design, I want to do a quality of
life plan. And I'll either have
another meeting such as this or
some kind of a less formal
setting; perhaps I'll get a
community advisement group. But
to have the residents of the area
give us feedback on what we're
doing and how we can reduce the
impacts on the community for the
selected remedy.

So, the remedy that is

Proceedings

preferred by EPA and New York State is the groundwater pump and treat.

This alternative would remove the groundwater, physically clean through treatment the contaminated groundwater, and we feel that as far as implementability in the neighborhood, that that would be the one that would impact the community the less.

We could place the wells in right-of-ways, and, as you saw from the in-well stripping and the bioremediation, there were a lot more wells within the neighborhood. So, that was one of the main reasons.

And then this is a permanent solution to clean up the aquifer to drinking water standards.

The cost of this remedy, the capital cost, the cost to install

Proceedings

1
2 it, is almost \$3 million. And
3 then the annual cost of operating
4 and maintaining the remedy is a
5 little over a million. And then
6 the present worth cost is 21 and a
7 half million.

8 And present worth costs are
9 costed over a thirty-year life.
10 So, that's if we ran this for
11 thirty years, that's what it would
12 cost.

13 And the time to construct
14 the remedy would be between six
15 and nine months.

16 Once we select the final
17 remedy, we write a Record of
18 Decision, and that's the final
19 decision document for the site.
20 And all the comments that are made
21 on the proposed plan will be
22 recorded in the Record of
23 Decision.

24 And there will be a
25 responsiveness summary. And

Proceedings

that's where EPA will answer each and every question -- each and every comment will be addressed in the responsiveness summary.

Once the Record of Decision is issued, then we enter the remedial design phase. That's where we draw up our engineering plans and our specifications for the remedy.

And then once that's completed, we enter the remedial action phase, which is where the remedy is actually implemented and the cleanup is performed.

This is my contact information for you to send me written comments. I'll take them either by mail or by fax or by e-mail. And then any comments that I receive will be addressed in the responsiveness summary.

And there's one more slide with the website. And in this

Proceedings

1 website, there's a copy of this
2 presentation that was uploaded
3 today, there's a copy of the
4 proposed plan, and there's -- I
5 think there's a fact sheet also
6 there.
7

8 Thank you very much for your
9 attention.

10 MS. ECHOLS: We're ready to
11 open up for any questions.

12 There is a mic in the back.
13 If you want, I can bring it down
14 for you or you can go to the mic
15 that's right up here in the back.

16 Any questions?

17 And you have to state your
18 name clearly for the stenographer.

19 Let me get the microphone.

20 MR. KISLAK: Thank you.

21 My name is Harold Kislak,
22 K-I-S-L-A-K.

23 My first question, is there
24 any contamination in the aquifer
25 that Long Island American Water

Proceedings

draws from their site just north?

I forget the name of it now
it started with a J. But that
seemed like it was a deeper
aquifer. You're talking about
contamination, I assume, at a
depth that's not that the deep.

MS. SOSA: The contamination
that we've investigated is not
that deep. The deepest was 75
feet below the ground surface.

In between there and our
contamination and the Jameco in
this area there's a nice clay
layer. It's not a continuous
layer throughout most of Long
Island, but we did find during our
investigation here that there's a
good clay layer in between.

MR. KISLAK: Yet, you have
some concern that the plume may --

MS. SOSA: We do have
concern --

MR. KISLAK: -- infringe

Proceedings

into that area.

But wouldn't it be -- it still might contaminate it even though it's at a much, much lower depth?

MS. SOSA: There's always that possibility that there would be problems, contamination, in the Jameco.

But EPA -- every time that the Long Island Water Corp. puts in a new well into the Jameco, if we have the opportunity, they have allowed us go and take samples before they do their chlorination processes.

So, we will continue to gather more information.

MR. KISLAK: Thank you.

MS. ECHOLS: More questions?

MR. KISLAK: I have a whole list.

MS. ECHOLS: Oh, you have a list.

1 Proceedings

2 Anyone else?

3 Don't be shy.

4 Okay. You can continue.

5 MR. KISLAK: Thank you.

6 Did you find evidence that
7 the plume is moving or expanding?

8 MS. SOSA: No, we did not.

9 The plume since we've been
10 studying has been quite stable and
11 not expanding.

12 MR. KISLAK: I was surprised
13 that -- when you say you don't
14 know or you can't identify the
15 source.

16 MS. SOSA: We have not yet
17 been able to define the source.

18 There are many dry cleaners
19 in the area and there are former
20 dry cleaners in the area. We've
21 taken a lot of soil samples, we've
22 looked at sewers, we've looked at
23 trenches, and so far we haven't
24 found any contaminated soil or
25 areas that we could remove, but we

Proceedings

will keep looking.

We have a plan that we just started, Operable Unit 2, and we will continue. That will be dedicated specifically to defining source?

MR. KISLAK: Obviously, I'm not the expert, but looking at the shape of the plume, it comes to a point right underneath the dry cleaners on West Broadway in both the deep and the shallow plume.

MS. SOSA: And we're aware of --

MR. KISLAK: Seems pretty obvious.

MS. SOSA: We're aware of that. We will be sampling in that area.

We took some samples there, and so far haven't found anything. So, we need to expand that to go deeper. And we also started looking into historical records to

Proceedings

1
2 see if we could find anything,
3 more information.

4 MR. KISLAK: I'm just
5 wondering also if you have a sense
6 of how much PCE would have to have
7 been released, assuming it was all
8 in one place, but just to create
9 the kind of plume and the density
10 that we see here?

11 MS. SOSA: I can't really
12 answer your question.

13 I know that a little bit of
14 PCE will go a long way. I know
15 that a thimbleful can contaminate
16 an area the size of a football
17 field.

18 MR. KISLAK: I'm just trying
19 to understand, is this something
20 that would have occurred in a one-
21 time spill or likely over the
22 course of year and years?

23 MS. SOSA: I would think
24 that perhaps there was more than
25 one spill and maybe even more than

Proceedings

one dry cleaner.

But we don't know.

MR. KISLAK: I think it said in the pamphlet -- I just wanted to confirm -- the results of the air contamination study, did you find contamination?

MS. SOSA: In the homes?

MR. KISLAK: Yes.

MS. SOSA: We sampled only about -- I can't recall the number, but it was twelve or thirteen homes. And of those buildings, one building had indoor air contamination that was just at our level of concern, and we installed one of those subslab depressurization systems. So, in one home.

MR. KISLAK: And at some point, you made the statement that there was no acceptable risk based on whatever various --

MS. SOSA: No current

Proceedings

unacceptable risk.

MR. KISLAK: Is that based on particular data?

MS. SOSA: That's based on the fact that people are not drinking the groundwater in the upper glacial aquifer.

They're drinking groundwater that's distributed through the public water supply, and that groundwater does not have contamination there. Therefore, there's no unacceptable risks.

MR. KISLAK: And there's no exposure -- you tested in the houses, but there wouldn't be exposure any other way unless -- if they're not drinking it, you're saying.

MS. SOSA: If they're drinking it and the only other way would be through the soil vapor intrusion, which we're also...

MR. KISLAK: Thank you very

Proceedings

much.

MS. SOSA: Thank you.

MS. HENICK: My name is Jenn
Henick.

And I'm just asking whether
or not you will still be testing
indoor air quality.

MS. SOSA: We will continue
to test for indoor air quality.

And if there are any one of
you here present today that think
that you live near this plume or
above this plume, I have a sign-up
sheet outside. And please leave
your name -- I'm sorry, we're
going to put it outside. So, you
can leave me your name and number.

We do this testing during
the heating season. At this site,
I've mostly done the testing in
early February. So, if that's
something you're interested in,
please leave me your name and
number, and I will call you.

Proceedings

MS. ECHOLS: Any more questions?

MR. WHITNEY: Hi. My name is Joe Whitney, and I have two questions.

Ballpark figure, rough timeline on the project from start to finish?

Obviously, your initial phase is now. You have to decide exactly what you're going to do.

MS. SOSA: Until remedial action happens, it would probably be a year and a half or so.

MR. WHITNEY: And once the remedial action occurs?

MS. SOSA: The remedial action is the actual implementation of the remedy.

MR. WHITNEY: Right.

MS. SOSA: Once it occurs, it will probably take to clean this up -- I don't remember how long we said, fifteen years,

Proceedings

twenty years, something like that,
to bring it to drinking water
standards.

MR. WHITNEY: Actually, I
have a third question.

Assuming you go with your
preferred method --

If I remember correctly,
that was using ground wells to
pump.

MS. SOSA: Groundwater pump
and treat.

MR. WHITNEY: Right.

-- and treat it, the
physical location of where it's
treated you said holding tanks,
and that would be somewhere in
that general area?

MS. SOSA: We would have to
build an aboveground treatment
building.

MR. WHITNEY: Okay.

MS. SOSA: And we have not
determined where we can do that.

Proceedings

We are in discussions with various entities; the county, et cetera.

MR. WHITNEY: It would be somewhere in the geographic area?

MS. SOSA: It would be close, it would be very close.

MR. WHITNEY: That leads to my next question. And it's obvious to everybody here that I'm a member of the local fire department.

Are there any concerns that we might have responding to a potential incident that may occur either at a holding tank or in a building where there may be vapor, a vapor build-up?

MS. SOSA: Well, the vapor, I know it's -- I don't believe that it's flammable.

Do you remember?

I don't think that PCE is a flammable vapor; however, we would work in concert with you, we would

Proceedings

1
2 show you what we're doing, and
3 then you could tell us what
4 concerns you may have, and then
5 we'll work together to address
6 them.

7 MR. WHITNEY: Obviously,
8 assuming we're aware --

9 MS. SOSA: We always work
10 with the fire departments to
11 ensure that you know where our
12 stuff is and that you have access
13 to it in an emergency.

14 MR. WHITNEY: As far as
15 something in the closed building,
16 we obviously have personal
17 protective Scott packs, gloves,
18 and turnout gear. But for some of
19 the things we encounter, that
20 clothing's not sufficient.

21 And that would lead back
22 even to if there was an incident
23 at a holding tank, say a spill,
24 break, something happened, we have
25 product leaking, these are things

Proceedings

that we want might want to address
for our safety too.

MR. MANNINO: Excuse me,
could I just add something?

MS. SOSA: Please.

MR. MANNINO: You have a
valid concern.

And one of the things that
we do during the design phase and
during our operation and
maintenance phase is we plan a
comprehensive health and safety
plans that addresses a lot of
these issues.

So, we would coordinate with
local authorities to make sure all
the local building ordinances are
adhered to, and we would
coordinate with you on a
responsive plan, if necessary.

MR. WHITNEY: And,
obviously, I'm not completely
altruistic. I want to make sure
if I respond to something, I go

Proceedings

home.

MR. MANNINO: Oh, naturally.

MR. WHITNEY: Little self-interest here.

MR. MANNINO: And just so you understand, there's a lot of redundancy built in to these systems. There's secondary containment systems that can be back-ups, there will be fire suppression if necessary.

So, we've done this at many sites, we've learned from our experiences, and we won't -- we wouldn't do an action if it wasn't safe for the residents in the area and the first responders.

MR. WHITNEY: Thank you.

MS. ECHOLS: Thank you.

Any more questions?

Yes? No?

MR. KRAMER: Morris Kramer.

It's hurricane season.

We're in, basically, a hurricane

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zone.

Are you aware of that?

And are you able to take precautions what to do in case a hurricane does come and what damage it might or might not do to what you're doing?

MS. SOSA: That would be one of the issues that we would address in the health and safety plan that Pete mentioned.

MS. ECHOLS: Any more questions?

MS. HENICK: Jenn Henick.

You mentioned that the cleanup, if it takes place, would probably last from fifteen to twenty years.

MS. SOSA: It could in order to --

MS. HENICK: So, over the course of that time, some of us who live in the neighborhood might be selling our homes.

FINK & CARNEY

REPORTING AND VIDEO SERVICES

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1
2 What is our obligation as
3 homeowners in terms of the
4 disclosure for -- you know, on a
5 Superfund site?

6 MS. SOSA: That's not my
7 area of expertise. I'm not sure
8 if anyone if there's anyone else
9 that can answer that question.

10 I know that New York State
11 is a disclosure state. So, that
12 where you have -- if I perform a
13 soil vapor intrusion sampling in
14 your house, then those results
15 would be available, you should
16 make them available when you sell
17 your home.

18 But I'm not sure.

19 MS. HENICK: Okay. Thank
20 you.

21 MS. ECHOLS: Going once?
22 Twice? Three times a lady?

23 Any more questions?

24 Okay. I guess we can say
25 that we'll end this meeting. We

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1
2 thank everyone for attending
3 tonight, and we will take all of
4 your questions and comments and
5 make them part of the
6 responsiveness summary.

7 At the end of the public
8 comment period on the 27th, we'll
9 then put a package together, a
10 decision will be made off the
11 comments, and we hope that the
12 regional administrator will sign a
13 Record of Decision for the cleanup
14 of the contaminated groundwater.

15 Sir?

16 MR. KISLAK: How will that
17 information get distributed?

18 MS. ECHOLS: Once the
19 decision has been made, a press
20 release will be prepared by the
21 office and sent to the local news.
22 And we will prepare a mailing and
23 send it to everyone who's in the
24 mailing when the decision has been
25 made.

Proceedings

MS. SOSA: And then that
Record of Decision will be added
to the document repository in the
library and our office and
probably uploaded to the website
as well.

MS. ECHOLS: Did everyone
get a copy of the website?

If you want to see the
presentation tonight, please visit
the website. Thank you.

MS. SOSA: Thank you very
much for coming.

(Time noted: 7:48 p.m.)

C E R T I F I C A T E

STATE OF NEW YORK)

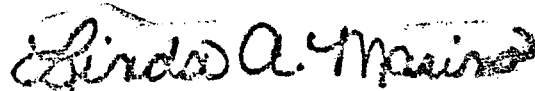
) ss.

COUNTY OF NEW YORK)

I, LINDA A. MARINO, RPR,
CCR, a Shorthand (Stenotype)
Reporter and Notary Public of the
State of New York, do hereby certify
that the foregoing transcription of
the meeting taken at the time and
place aforesaid, is a true and
correct transcription of my
shorthand notes.

I further certify that I am
neither counsel for nor related to
any party to said action, nor in any
way interested in the result or
outcome thereof.

IN WITNESS WHEREOF, I have
hereunto set my hand this 26th day
of August, 2011.



LINDA A. MARINO, RPR, CCR

RESPONSIVENESS SUMMARY

APPENDIX V-e

CORRESPONDENCE RECEIVED DURING THE COMMENT PERIOD



**NASSAU COUNTY
DEPARTMENT OF HEALTH**
106 CHARLES LINDBERGH BLVD.
UNIONDALE, NEW YORK 11553

August 11, 2011

Ms. Gloria M. Sosa
Remedial Project Manager
USEPA Region 2
290 Broadway
New York, NY 10007

Re: Peninsula Blvd. Groundwater Contamination Superfund site
Hewlett, NY
Proposed Remedial Action Plan

Dear Ms. Sosa,

I would like to take this opportunity to thank you for your presentation on August 3rd, 2011 at Hewlett High School. I would also like to take this opportunity to clarify an issue that was brought up at this meeting regarding the source of the public water supply in the Hewlett area.

The primary source of drinking water for this area comes from the Long Island American Water Corporation's well field located at Starfire Court which is located hydraulically down gradient and in close proximity to the above-referenced site. I would also like to mention that this well field has approximately 75 active water supply wells that are screened between 20' and 160' Below Ground Surface. The daily pumpage rate for this well field is approximately 8 Million Gallons per Day and most likely has an influence on the groundwater flow anomaly observed in the study area – regional groundwater flow would be expected to be southwest and the observed flow direction at the site is northwest, towards the well field.

The Starfire Court well field also treats its water for voc's prior to distribution. These voc's are primarily, tetrachloroethene, trichloroethene and 1, 2 dichloroethene, at concentrations generally below 10 ppb in the raw water. As you are aware, these contaminants are the same contaminants found at the above-referenced site.

While you mentioned that the public water supply comes from the Jameco aquifer and this aquifer is separated from the above Glacial aquifer by a clay layer protecting it from site-related contamination, that statement is not completely accurate. Nor is the assumption that site-related contamination is not affecting the Starfire Court well field.

Gloria Sosa
August 11, 2011
Page 2

In conclusion, unless additional monitoring data can prove there is either another source of voc contamination or there is no connection between the Peninsula Blvd. Groundwater Contamination site and the Starfire Court well field, it cannot be concluded that this site is not the primary or a contributing source of voc contamination at the well field.

Very truly yours,

Signed 8/11/11

Joseph DeFranco
Director, Office of Soil and Groundwater Remediation

Cc: Susan G. King, Director – Div. of Env Health, NCDH
Donald Irwin, Director – BEEI, NCDH
Brian Devine, Director, MARO - NYSDOH
Steven M. Bates, Charlotte Bethoney, Steven Karpinski, NYSDOH - BEEI
Melissa Sweet, John Swartwout, NYSDEC- Central Office
Walter Parish, NYSDEC – Region 1

E-MAIL COMMENTS RECEIVED

Please add Hewlett, NY to the superfund list. I live nearby, shop nearby and there is a school located close by.

Jeffrey Solomon

From: Home <jeffsolly@aol.com>

To: Gloria Sosa/R2/USEPA/US@EPA

Date: 08/16/2011 03:48 PM

Subject: Hewlett NY plume

Ms Sosa-

We sincerely request that the contaminated water at 1274 Peninsula Blvd, Hewlett, New York be treated very soon. I don't really understand how this instance of water pollution was not acknowledged until now. I see there are three options for cleaning up this dangerous water. I hope that the one used will not be the most expedient but rather the one that will benefit the health and well being of the residents who will have to drink this water.

The Environmental Protection Agency is supposed to oversee potential hazards that effect our quality of life. This matter is very important.

Thank you.

Judith and Gary Baum

From: Judith Baum <baum.judith@gmail.com>

To: Cecilia Echols/R2/USEPA/US@EPA

Date: 08/15/2011 05:07 PM

Subject: Water pollution, Hewlett NY

Sent by: judith BAUM <judydb@gmail.com>

Dear Ms. Echols,

Please give Hewlett, NY the "Superfund" status to clean up our water supply. As a resident of this neighborhood, it is of utmost importance that our drinking water be contaminant free.

Thank you for your attention to this matter.

Sincerely

Denise Cohen-Kronfeld, DMD

From: smileyf949@aol.com

To: Cecilia Echols/R2/USEPA/US@EPA

Date: 08/19/2011 01:54 PM

Subject: Hewlett, NY Water

Dear Ms. Cecilia Echols,

I am writing to you as a resident of Hewlett, NY. Please give 1274 Peninsula Blvd in Hewlett, NY "Superfund" status. This location is near Woodmere Middle School and is approximately 1000 feet south of a Long Island American Water Company water well that provides drinking water to our community. Thank you.

Paolo Sapienza

From: P S <paolosap@yahoo.com>

To: "echols.cecilia@epa.gov" <echols.cecilia@epa.gov>
Sent: Thursday, August 18, 2011 1:01 PM
Subject: Hewlett superfund

Hi Sosa,

I recently read in the local paper the EPA's plan to clean the Hewlett Superfund site which I found to be terrific news however, what steps are being taken to ensure this doesn't happen at other dry cleaner locations in the area? It took decades before anyone knew that the old Grove Cleaners was the cause of the current superfund site. I'm a 30 year Hewlett resident living on Hamilton Ave and I have reservations about Cedar Wood Cleaners located on West Broadway. Is there a study the EPA can perform to ensure that no groundwater or adjacent property owner is at risk of any carcinogenic contaminants are being discharged by the cleaner? Your response would be greatly appreciated.

Anthony Giordano

From: Anthony Giordano <anthonyggiordano@yahoo.com>
To: Gloria Sosa/R2/USEPA/US@EPA
Date: 08/21/2011 11:43 AM
Subject: Hewlett Superfund

Dear Ms. Echols, thank you for taking the time to talk with me.

We live at 1095 Fordham Lane, Woodmere, New York on the Motts Creek extension of Doxey Brook.

Attached is the letter from Howard Kopel, our local legislator.

As residents we feel that it is important to clean this problem up.

If you would like to speak to me, my telephone number is (212) 508-0440.

Thank you very much for your help.

Ken Crystal

From: "Kenneth R. Crystal" <KCrystal@phillipslytle.com>
To: "echols.cecilia@epa.gov" <'echols.cecilia@epa.gov'>
Date: 08/25/2011 01:51 PM
Subject: FW: Peninsula Plvd in Woodmere NY

Ms Echols,

After reading the attached letter, I fully support federal cleanup of this Hewlett site and urge you to give it "Superfund" status immediately.

Thanking you in advance,

Megan Maguire

From: Megan Maguire <megela87@yahoo.com>
To: Cecilia Echols/R2/USEPA/US@EPA
Date: 09/02/2011 01:40 PM
Subject: Hewlett Superfund

V-17

500226

Ms Echols,

After reading the attached letter, I fully support federal cleanup of this Hewlett site and urge you to give it "Superfund" status immediately.

Thanking you in advance,

Elizabeth Chiari

From: "Liz Chiari" <Liz_Chiari@qintl.com>

To: Cecilia Echols/R2/USEPA/US@EPA

Date: 09/02/2011 01:24 PM

Subject: Hewlett Superfund